



DCB FT-DSU/CSU
Models FT-2DS and FT-4DS
USER'S MANUAL

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217-352-3207

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FCC Requirements, Part 15

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

FCC Requirements, Part 68

This equipment complies with Part 68 of the FCC rules. On the top cover of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

DCB FT-DSU/CSU registration number and REN is as follows:

FCC 68 Registration Number	5QGUSA-23519-DE-N
REN	0.0B

The service code is 6.0N.

The Facility Interface code is as follows,

04DU9-B for lines using the Superframe Format.

04DU9-C for lines using the Extended Superframe Format.

04DU9-S for lines using the B8ZS Format.

DCB FT-DSU/CSU connects to the network using a DA15 connector. A DA15 to RJ48C conversion cable is included.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

Normally, this equipment will be used in conjunction with FCC registered equipment that limits the Encoded Analog Content and provides the required Billing Protection. If the connected equipment is not of this type, an affidavit must be supplied to the telephone company where the network connection is to be made. The affidavit is to be notarized, and is to be filed at least ten days before the initial connection.

If trouble is experienced with this equipment, please contact Data Comm for Business, Inc., (217) 352-3207 or fax to (217) 352-0350 for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved. All repairs should be handled by authorized Data Comm for Business service personnel.

This equipment cannot be used on telephone company-provided coin service. Connection to Party Line Service is subject to state tariffs.

Safety Requirements

CAUTION

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch bare telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Refer to the installation section in this manual for a safe and proper installation procedures. All wiring external to this equipment should follow the current provision of the National Electrical Code.

National Electrical Code Requirements

The DCB FT-DSU/CSU including this equipment, is ETL certified, and is in compliance with UL 1459.

TABLE OF CONTENTS

SECTION 1 - PRODUCT DESCRIPTION.....	3
SECTION 2 - INSTALLATION.....	5
SECTION 3 - OPERATION.....	11
SECTION 4 - FRONT PANEL OPERATION AND INDICATORS.....	25
SECTION 5 - SUPERVISOR PORT	47
SECTION 6 - INTERFACE SIGNALS AND CABLING.....	61
SECTION 7 - TROUBLESHOOTING	67
SECTION 8 - WARRANTY.....	75
SECTION 9 - GLOSSARY	77

1. PRODUCT DESCRIPTION

1.1 Description

DCB FT is a family of intelligent Fractional T1 Data Service Unit and Channel Service Unit (DSU/CSU) products as shown in Table 1.1. This product family provides DS-1 network interface, DS0 channel multiplexing, D&I (Drop and Insert) functionality, and direct connections to voice, data, and video DTE (Data Terminal Equipment), as well as T1 channel bank and PBX (Private Branch Exchanges).

Table 1.1 DCB FT Product Family

Model	Network Interface	Drop and Insert	SNMP	DTE Ports
FT-2DS	DS-1	YES	YES	2
FT-4DS	DS-1	YES	YES	4

DCB FT-DSU/CSU is equipped with local and remote console capability through an RS232 interface. SNMP (Simplified Network Management Protocol) Proxy Agent software that resides on a PC DOS platform is available to access the DCB FT-DSU/CSU from the SNMP Manager.

1.2 Applications

FT-DSU/CSU applications include:

- LAN (Local Area Network) to WAN (Wide Area Network) communications
- Host to workstation communications
- Video conferencing
- Integrated voice and data communication or PBX (Private Branch Exchanges)

This allows the user to integrate different applications into a single communication link and utilize only part of available bandwidth, or all 24 DS0 channels. Voice applications may include equipment such as PBXs, Channel Banks, and Multiplexers. Data and video applications may include equipment such as video conferencing, bridges, routers, gateways, workstations, host computers, and various high-speed data terminal equipment.

2. INSTALLATION

2.1 Unpacking

This product is shipped in a complete package which contains DCB FT-DSU/CSU and accessories such as user's manual and DB25 to V.35 or RS449 conversion cable.

Check the shipping material against Table 2.1 Shipping Material List. Inspect the unit for any signs of damage. Report any damage to the carrier and contact DCB or DCB's customer representative. Retain all packaging material in case you need to move or ship the unit in the future.

Table 2.1 Shipping Material List

Description	Item
DCB FT-DSU/CSU with 2 or 4 DTE ports	1
DA-15 to RJ-45 T-1 composite cable	1
User's Manual	1

2.2 Site Selection

The following list indicates a site selection guideline. Follow this guideline to select a proper installation site.

- The installation site should have a 115V AC power receptacle.
- The maximum cable length is suggested as the following.

V.35 Cable	200 Feet
RS-449	200 Feet
RS-232	200 Feet
- The installation site should provide room for adequate ventilation and cable routing. Reserve at least 5 inches at the rear of the unit for cables and air flow.
- The site should provide a stable environment. The operating area should be clean and free from extremes of temperature, humidity, shock, and vibration.
- Relatively humidity should stay between 0 and 95%.

2.3 Physical Installation

2.3.1 Mechanical

The DCB FT-DSU/CSU can be installed as a desk top unit or mounted in a 19 inch or a 23 inch rack. The 19 inch and 23 inch rackmount is shown in Figure 2.1.

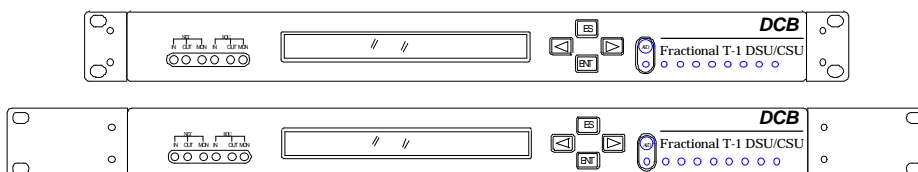


Figure 2.1 DCB FT-DSU/CSU Rack Mount View

2.3.2 Electrical

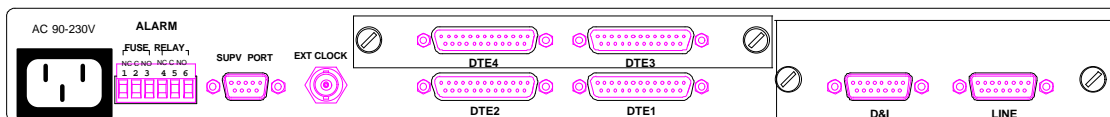


Figure 2.2 DCB FT-4DS Backplane

Figure 2.2 shows the rear panel of DCB FT-4DS DSU/CSU. The right portion is a plug-in board containing a T1 line and D&I interface labeled LINE and D&I, respectively. The T1 Line side is a male DA 15 connector, and the D&I side is a female DA 15 connector. Connector pins are defined in Section 6.

The center portion of the rear panel has the built-in DTE1 and DTE2 ports. Above it is a plug-in board containing optional DTE3 and DTE4 ports. The ports are configured as DCE devices with DB 25 connector. One DB 25 to V.35 or DB 25 to RS 449 conversion cable is required for proper application. These conversion cables are illustrated in Section 6 and are available from DCB or its representative. The DTE port interface is defined in Section 6.

The BNC connector is for external clock input. The external clock signal should be TTL level with ± 32 ppm accuracy and 40 to 60 % duty cycle.

The supervisor port is configured as DTE with a DE-9P connector. It complies with the RS232 standard. It can be connected to a local terminal or remote terminal via modem. Connector pin definition is in Section 6.

The 6 pin connector is for an external alarm such as a buzzer or flashing light. Connector pin definition is in Section 6.

2.4 Configuration

2.4.1 Hardware

All configurations are software programmable. There are no internal modifications required.

2.4.2 Software

There are three sets of software configuration:

- Factory default configuration
- User stored configuration
- Working configuration

The factory default configuration is not changeable. The equipment is shipped with all three configurations the same as the factory default configuration. The current working configuration may be changed at any time. Also, the current working configuration may be saved into a non-volatile memory as the user stored configuration. The stored configuration may be retrieved at any time to reset the current working configuration. Please refer to Section 4 and Section 5 for details. The system memorizes the current working configuration. When the system is powered off and on again, the previous working configuration is retrieved as the current working configuration.

To restore factory default configuration, press the ESC key during power up and then press ENTER key while the LCD displays "SELF TEST". If the operation is successful, the LCD will show "LOAD DEFAULT CONFIGURATION".

2.4.3 Default Settings

<u>Supervisor Port</u>	<u>Default</u>
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity Bit	NONE
XON-XOFF	OFF
Interface	TERMINAL
SNMP	OFF

<u>T1 Line</u>	<u>Default</u>
Frame Format Mode	D4
Line Code Mode	AMI
Line Build Out	0 dB
Yellow Alarm	ON
Inband Signaling	ON
TABS Address	CSU
Idle Code	FF

<u>Drop and Insert Port</u>	<u>Default</u>
Frame Format Mode	D4
Line Code Mode	AMI
Equalizer	0-133 feet

<u>DTE Port</u>	<u>Default</u>
Rate	64KxN
Clock	NORMAL
Data	NORMAL
Interface	RS449
RTS	ACTIVE
TTM	OFF

<u>Active Map</u>	<u>Default</u>
MAP1	all idle
MAP2	all idle
Switch MAP1:	(00:00 - 12:00)
MAP2:	(12:00 - 00:00)

<u>Clock</u>	<u>Default</u>
Master Clock	Line Clock
2nd Clock	Line Clock
External Clock Rate	1.544 Mbps

<u>Alarm Threshold</u>	<u>Default</u>
Alarm Enable	Disable
Alarm Relay	Disable
Alarm Dial-out	Disable
BPV, Line and D&I	10 ⁻⁵
ES, Line	1
UAS, Line	1
CS, Line	1
ES, D&I	1
UAS, D&I	1

<u>Dial Out</u>	<u>Default</u>
Primary Dial String	ATDT
Start Time	08:00
Stop Time	07:59
Secondary Dial String	ATDT
Start Time	08:00
Stop Time	07:59
Inactivity Timeout	0 Minutes

<u>Misc.</u>	<u>Default</u>
Password	DCB
Device Name	DCB-FT-01
LCD-menu-lock	Disable
Password lock	Disable
SNMP-lock	Disable

2.5 Configuration Checklist

- Map the telco channels (1-24) to the desired port(s). Section 3.2
- Set the telco LINE parameters to match your phone line. Section 3.3
- Set the D&I port parameters if required. Section 3.4
- Set the DTE port rate to match the telco line rate (56K x N or 64K x N where N=1-24 channels mapped to that port). Section 3.5
- Set the DTE port interface to match the attached equipment (RS-449 or V.35). Section 3.5

3. OPERATION

This section describes DCB FT-DSU/CSU configuration options and operational functions. Refer to Section 4, Front Panel Operation or Section 5, Supervisor Port for detailed procedures.

3.1 System Operation

3.1.1 Real Time Clock

This product is equipped with a Real Time Clock. The current date and time may be changed as necessary. The clock battery has a 10 year life. For detailed operation please refer to Section 4.10 or Section 5.17.

3.1.2 Master Clock

This product has a system clock Phase Lock Loop which may be locked to the:

- T1 line clock
- Drop and Insert clock
- DTE clock
- internal clock
- external clock

The T1 line clock, Drop and Insert clock, and internal clock are all 1.544 Mbps. The DTE clock is either 56KxN, or 64KxN bps (N is 1 to 24 DS-0 channels). The external clock rate can be 56KxN or 64KxN bps (N is from 1 to 24), 1.544 Mbps, or 6.176 Mbps. For detailed operation please refer to Section 4.5 or Section 5.16. The default master and 2nd clock source are T1 line clock. The default external clock frequency is 1.544 Mbps.

When the master clock source is lost, the system will automatically switch to the 2nd clock source. This is to provide an alternative clock source when the primary clock source is lost. The current active clock source is shown by the LCD "MCLK" command and terminal "S" and "C" commands. If a 2nd clock source is not necessary, the user MUST select the 2nd clock source the same as the master clock source. When the 2nd clock source is lost as well, the FT-DSU/CSU will switch to internal clock source automatically. The FT-DSU/CSU will automatically switch back to the 2nd clock source when it is resumed.

To switch the active clock source from the 2nd clock back to the master clock, the user MUST toggle the master clock source selection on the front panel "MCLK" command or terminal "S" command and save the configuration.

3.1.3 Supervisor Port

The supervisor port allows the use of a VT-100 terminal, directly or remotely connected via modem, to configure the system and perform diagnostics, poll status reports, etc.. The serial port of the terminal must be set to match the settings of the supervisor port. If necessary, use the Front Panel to setup supervisor port to utilize local or remote terminal. The supervisor port baud rate, data bit length, stop bit length, parity bit length, XON-XOFF flow control, and interface options are shown in Table 3.1. For detailed operation please refer to Section 5.

Table 3.1 Supervisor Port Settings

Item	Options	Default
Baud Rate	1200, 2400, 9600, 19200, 38400 bps	9600
Data Bits	8, 7	8
Stop Bits	2, 1	1
Parity	NONE, EVEN, ODD	NONE
XON-XOFF	ON, OFF	OFF
Interface	TERMINAL, MODEM	TERMINAL
SNMP	ON, OFF	OFF

3.1.4 Menu Lock and Password

LCD front panel, terminal, as well as SNMP operations are used to read alarms, system configurations, and system status. Also, these operations may be used to change system configurations and clear alarm queue, etc.. However, if LCD-menu-lock, password, or SNMP-lock is enabled, only read operations are allowed. The user may not change system configurations or clear performance data. To control LCD-menu-lock, password, and SNMP-lock please refer to Section 4.11 or Section 5.14.

The default option of menu-lock and password is disabled.

The default terminal access password is "DCB".

The default SNMP lock is disabled.

3.1.5 Configuration

Current configurations may be saved into a non-volatile memory. This allows user to retrieve the last stored configuration. For detailed operation please refer to Section 4.1 - 4.6 or Section 5.16 - 5.18.

3.2 DSO Channel Map

DS0 channel multiplexing is done by the DS0-MAP command. From 1 to 24 DS0 channels can be assigned to any one of the DTE or Drop and Insert ports. Two maps are available to keep different DS0 channel assignments. A SWITCH command is available to automatically switch between MAP1 and MAP2 at a scheduled time. This mode is only available in ESF frame format. The DCB FT-DSU/CSU will send the active DS0 maps to the remote side when the SWITCH command is set and when switch time expires. If the remote side doesn't respond, the local DCB FT-DSU/CSU alerts a fail message. All unused channels are idle. An idle code is transmitted on those unused channels. For detailed operation please refer to Section 4.1 or Section 5.16.

The default active map is MAP1.

The default DS0 channel assignment of both MAP1 and MAP2 are idle channel. The default switch time is MAP1 (00:00 to 12:00) and MAP2 (12:00 to 00:00).

NOTE

For DS1 network interface with B8ZS coding or all DTE ports with 56KxN bps, all 24 channels are available for DS0 multiplexing configuration.

NOTE

For DS1 network interface with AMI coding and DTE ports with 64KxN bps, only alternate odd or even DS0 channels should be used. This is required to guarantee one's density requirement.

3.3 DS1 Network Line Configuration

A detailed option list of T1 line configuration is in Table 3.2. The following paragraphs describe each item.

Table 3.2 T1 Line Default Settings

Item	Options	Default
Frame Format Mode	D4, ESF, ESF&T1.403	D4
Line Code Mode	AMI, B8ZS	AMI
Line Build Out	0, -7.5, -15 dB	0 dB
Line Equalizer	0-133, 133-266, 266-399, 399-533, 533-655 feet	0-133 feet
Yellow Alarm	ON, OFF	ON
Inband Signaling	ON, OFF	ON
Address	CSU, TE	CSU
Idle Code	00 ~ FF	FF

3.3.1 Frame Format Mode

This equipment can be used in T1/D4 and ESF frame format DS1 network interface. In ESF frame format mode, the user can choose either AT&T or ANSI facility data link protocol. To set this option, please refer to Section 4.2.1 or Section 5.16. ESF&T1.403 chooses ANSI ESF data link protocol and one second performance report will be sent to the network automatically. Also, ANSI and AT&T data link message is acceptable in ANSI ESF frame format mode. However, AT&T ESF frame format mode will only accept AT&T ESF data link protocol.

3.3.2 Line Code Mode

This equipment can be used in AMI (Alternate Mark Inverting) and B8ZS (Bipolar 8 Zero Substitution) line code format. For detailed operation please refer to Section 4.2.2 or Section 5.16.

3.3.3 Line Build Out

The T1 line long haul transmit LBO can be programmed to either 0 dB, -7.5 dB, or -15 dB relative to DSX-1. For detailed operation please refer to Section 4.2.3 or Section 5.16.

3.3.4 Yellow Alarm

DCB FT (DSU/CSU) transmits yellow alarm when LOS (Loss of Signal), AIS (Alarm Indication Signal), or OOF (Out of Frame) is detected for 2.5 ± 0.5 seconds. The user can disable this feature using the disable yellow alarm command. For detailed operation please refer to Section 4.2.4 or Section 5.16.

3.3.5 Inband Signaling

In T1/D4 framing format and ESF (both AT&T and ANSI data link protocol), an inband loopback code recognition is used to activate remote loopback operation. For detailed operation please refer to Section 4.2.5 or Section 5.16.

3.3.6 Address

In T1/ESF framing format, TABS operation requires an address of either CSU (Channel Service Unit) or TE (Terminal Equipment) identification. For detailed operation please refer to Section 4.2.6 or Section 5.16.

3.3.7 Idle Code

Any DS0 channel which is not assigned to a DTE port or the D&I port is an idle channel. An idle code is transmitted on idle DS0 channels. The user may program the idle channel to any bit pattern from 00H to FFh. For detailed operation please refer to Section 4.2.7 or Section 5.16.

NOTE

Due to the one's density requirement, it is advised that the idle code to be set to FFh. Otherwise, the user must set the idle code to contain at least two '1' bits. The factory default idle code is FFh.

3.4 Drop and Insert Configuration

A detailed option list of T1 Drop and Insert configuration is in Table 3.3. The following paragraphs describe each item.

Table 3.3 Drop and Insert Default Setting

Item	Options	Default
Frame Format Mode	D4, ESF	D4
Line Code Mode	AMI, B8ZS	AMI
Equalizer	0-133, 133-266, 266-399, 399-533, 533-655 feet	0-133 feet

3.4.1 Frame Format Mode

The Drop and Insert interface can be used in T1/D4 and ESF frame format. To set this option, please refer to Section 4.3.1 or Section 5.16.

3.4.2 Line Code Mode

The Drop and Insert interface can be used in AMI (Alternate Mark Inverting) and B8ZS (Bipolar 8 Zero Substitution) line code format. For detailed operation please refer to Section 4.3.2 or Section 5.16.

3.4.3 Equalizer

The Drop and Insert interface transmit equalizer can be programmed to 0 - 133 feet, 133 - 266 feet, 266 - 399 feet, 399 - 533 feet, or 533 - 655 feet. The transmit signal at the distant end with 100 ohm termination meets the ANSI and AT&T signal template requirements. To set this option, please refer to Section 4.3.3 or Section 5.16.

3.5 DTE Configuration

This product is equipped with 2 DTE ports and 2 optional DTE ports may be added at any time. The system will recognize their existence automatically. However, all DTE ports must be configured individually for proper operation. A detailed list of DTE port configuration options is in Table 3.4. The following paragraphs describe each item.

Table 3.4 DTE Port Default Setting

Item	Options	Default
Rate	56K, 64KxN (N=1 ~ 24)	64KxN
Clock	NORMAL, INVERTED	NORMAL
Data	NORMAL, INVERTED	NORMAL
Interface	RS449, V.35	RS449
RTS	ACTIVE, PERMANENT	ACTIVE
TTM	ON, OFF	OFF

3.5.1 Rate

The DTE ports can operate at 56KxN or 64KxN bps, (N is 1 to 24). Use the Rate command to select 56K or 64K. Use DS0 MAP command to select number of DS0 channels. For detailed operation please refer to Section 4.4.1 or Section 5.16 for Rate command and Section 4.1 or Section 5.16 for DS0 MAP command.

3.5.2 Clock

Clock polarity of the DTE port is either normal or inverted and is used to drive the transmit data and to sample the receive data. For detailed operation please refer to Section 4.4.2 or Section 5.16.

3.5.3 Data

Data polarity of a DTE port is either normal or inverted which is used as positive logic or negative logic. For detailed operation please refer to Section 4.4.3 or Section 5.16.

3.5.4 Interface

DTE port interface can be either RS449 or V.35. A conversion cable is required for each DTE port. The user must specify the proper interface type when ordering. Conversion cables are illustrated in Section 6. To set this option, please refer to Section 4.4.4 or Section 5.16.

3.5.5 RTS

DTE facility can use RTS (Request To Send) to control transmission. When RTS is "ACTIVE" and OFF, all ones are sent to the T1 line side on the DTE port associated DS0 channels. When RTS is "PERMANENT", the RTS signal is ignored. To set this option, please refer to Section 4.4.5 or Section 5.16.

3.5.6 TTM

Normally the DCB FT uses Transmit Clock to sample DTE Transmit Data. In terminal timing mode, the DTE facility uses Receive Clock to drive Transmit Data and loops this clock to the DCB FT via External Clock. And, the DCB FT will use External Clock to sample Transmit Data instead of using Transmit Clock. This method is to avoid phase delay due to cable length. In other words, if the DTE cable is too long, the transmit data may not in-phase with the Transmit Clock. With this feature, the External Clock and Transmit Data will be in-phase. To set this option, please refer to Section 4.4.6 or Section 5.16.

3.6 Alarms and Reports

3.6.1 Alarms

The DCB FT has twenty types of alarms as listed in Table 3.5. Also, DCB FT has an alarm queue which records the latest 40 alarms with time stamp. DCB FT also has alarm history and alarm status registers which are used to track the alarm count. Each alarm can be individually enabled or disabled. When disabled, no action is taken. When enabled, the alarm counter increments on the occurrence of the specific type of alarm. When an alarm occurs or the counter threshold is exceeded, the alarm is triggered.

When an alarm is triggered, a dial-out or alarm relay is activated if enabled. Otherwise, no action is taken and only the specific alarm count is incremented. Dial-out is to dial out through modem to a remote terminal. Alarm relay is connected to an external buzzer or flashing signal via the alarm relay connector as shown in Paragraph 6.1.5. Please refer to Section 5.13 for detailed operation. When a threshold level is implemented, it is based on the 15 minute alarm count register.

All alarms default to disabled, dial-out and alarm relay also default to disabled.

Both primary and secondary dial-out strings are Hayes compatible AT dialing commands. The DCB FT will send the following AT commands to initialize the modem when modem interface type is selected. The user may add specific commands in the dialing string to suit their environment.

1. Auto answer, S0=1.
2. Ignore DTR signal, &D0.
3. Track carrier, &C1.
4. Echo off, E0.
5. Display result codes in verbose form, V1
6. Return result code, Q0.
7. Wait time for carrier 45 sec, S7=45.
8. Save, &W0 &Y0.

Inactivity timeout can be programmed by the "S" command as in Section 5.16. After an alarm message is sent, the FT-DSU/CSU waits for the specified number seconds and then disconnects the modem. If a new alarm is sent during that period, the timeout counter is reset. Inactivity timeout of 0 seconds will cause immediate disconnect of the modem after an alarm message is sent.

The alarm counter is updated every 15 minutes. Alarm current status shows the current state of the associated alarm. The BPV threshold level is a level of error rate of 10^{-5} to 10^{-9} .

Table 3.5 Alarm Type Table

ALARM TYPE	ALARM DESCRIPTION	THRESHOLD
"MAST-CLK LOSS"	Master Clock Loss	no
"YEL,LINE"	T1 Line Yellow Alarm	no
"AIS,LINE"	T1 Line Alarm Indication Signal	no
"LOS,LINE"	T1 Line Loss of Signal	no
"LOF,LINE"	T1 Line Loss of Frame	no
"BPV,LINE"	T1 Line Bipolar Violation 10E- (5, 6, 7, 8, 9)	yes (default 5)
"ES,LINE"	T1 Line Error Second (0 to 900)	yes (default 1)
"UAS,LINE"	T1 Line Unavailable Second (0 to 900)	yes (default 1)
"CS,LINE"	T1 Line Control Slip (0 to 900)	yes (default 1)
"DTE1 ALARM"	DTE1 RTS loss or clock loss in TTM	no
"DTE2 ALARM"	DTE2 RTS loss or clock loss in TTM	no
"DTE3 ALARM"	DTE3 RTS loss or clock loss in TTM	no
"DTE4 ALARM"	DTE4 RTS loss or clock loss in TTM	no
"YEL,D&I"	D&I Port Yellow Alarm	no
"AIS,D&I"	D&I Port Alarm Indication Signal	no
"LOS,D&I"	D&I Port Loss of Signal	no
"LOF,D&I"	D&I Port Loss of Frame	no
"BPV,D&I"	D&I Port Bipolar Violation 10E- (5, 6, 7, 8, 9)	yes (default 5)
"ES,D&I"	D&I Port Error Second (0 to 900)	yes (default 1)
"UAS,D&I"	D&I Port Unavailable Second (0 to 900)	yes (default 1)

3.6.2 Reports

The DCB FT has four sets of performance registers. These are line, user, D&I, and far-end. The line performance register tracks the line receiver performance status. The user performance register tracks the line receiver as well, but the user may clear this register at any time. The D&I performance register tracks the D&I port receiver status. The far-end performance register tracks the far-end receiver status. The performance parameters are listed in Table 3.6. While, the user performance register and D&I performance register have two additional parameters. One is a BPV register to count bipolar violations in both D4 and ESF modes. The other is ESF to track framing and CRC errors in ESF frame format mode only.

Each performance parameter has 96 sets of register to record 24 hours history in 15 minute intervals.

Table 3.6 Performance Report List

Param	Description	Definition (T1/D4)	Definition (ESF)
ES	Error Second	BPV \geq 1, OOF \geq 1, or CS \geq 1.	CRC6 ERROR \geq 1, OOF \geq 1, or CS \geq 1.
BES	Bursty Error Second	1 < BPV < 1544	1 < CRC 6 < 320
SES	Severe Error Second	BPV \geq 1544, or OOF \geq 1	CRC6 \geq 320, or OOF \geq 1
CSS	Controlled Slip Second	frame slip \geq 1	frame slip \geq 1
OOF	Out of Frame	2 frame bit error in 6 consecutive frame bits	2 frame bit error in 6 consecutive frame bits
LOFC	Loss Of Frame Count	OOF for 2.5 \pm 0.5 sec	OOF for 2.5 \pm 0.5 sec
UAS	Unavailable Second	\geq 10 consecutive SES	\geq 10 consecutive SES
BPV	Bipolar Violation	Bipolar Error Count	Bipolar Error Count
ESF	CRC6 Error, or Out Of Frame	(not used, always 0)	CRC6 error or OOF

3.6.3 Requesting Report

In both T1/D4 and ESF frame format mode, the performance report can be accessed from a local terminal directly or from remote terminal via modem. Please refer to Section 5.1 or 5.2 for detailed operation.

Also, in ESF mode, the performance report can be accessed via data link. The user will choose either AT&T or ANSI T1.403 data link operation in the DS1 network line interface configuration as described in Section 3.3. AT&T TR 54016 should be referred to as how the performance report request message and response message are structured. ANSI T1.403 should be referred to as how the one second performance report message is structured.

The DCB FT supports both AT&T TR 54016 and ANSI T1.403 performance report messages. To set this option, please refer to Section 4.2.1 or Section 5.16.

3.7 Bantam Jacks

Figure 3.1 shows the block diagram of the bantam jack. It is used to monitor and isolate fault on the D&I port to detect and isolate D&I facility malfunction.

Break and Test Jacks

NET-IN	Insert signal toward T1 network
NET-OUT	Receive signal from T1 network
EQU-IN	Insert signal toward D&I equipment
EQU-OUT	Receive signal from D&I equipment

Monitor Jacks

NET-MON	Monitor T1 network signal
EQU-MON	Monitor D&I equipment signal

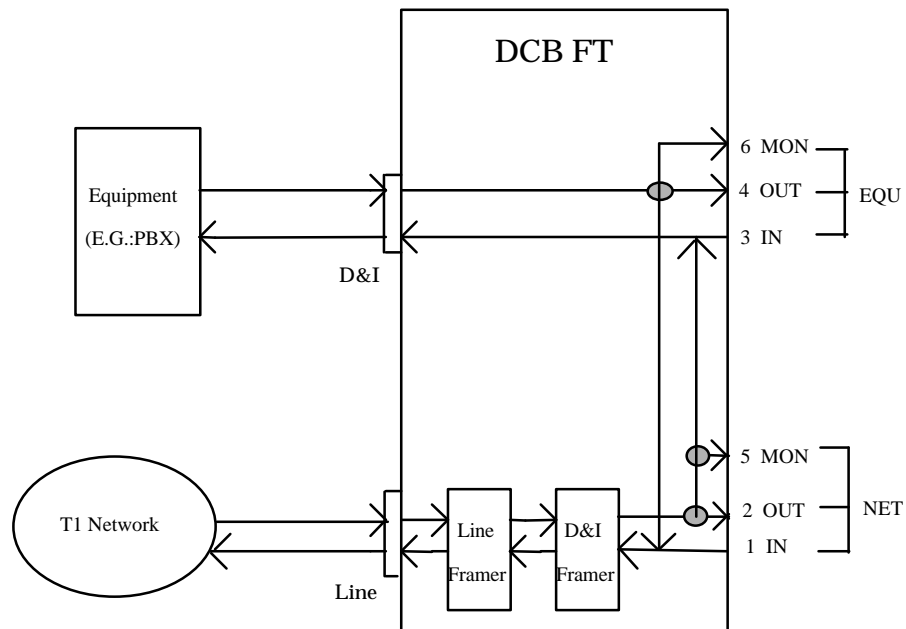


Figure 3.1 Bantam Jack Block Diagram

3.8 Error Messages

The DCB FT provides various error messages on the LCD display to indicate an abnormal condition as listed in Table 3.8.

Table 3.8 Error Messages

ERROR CODE	ERROR DESCRIPTION
ERROR01	A loopback is in effect
ERROR02	ESF or ESF&T1.403 mode is required
ERROR03	D&I isn't mapping to any DS0
ERROR04	DTEn can't be in TTM if MCLK=DTEn
ERROR05	DTEn is in TTM or MCLK=DTEn
ERROR06	Can't change active map of SWITCH
ERROR07	No DS0 channel is assigned
ERROR08	Modem error
ERROR09	A diagnostic test is in progress
ERROR10	DTE local loopback is in progress
ERROR11	SNMP_SLIP mode is in progress

3.9 Embedded SNMP Agent

The embedded SNMP agent for the DCB FT offers standard RFC 1213 MIB II and RFC 1406 DS1 MIB as well as DCB's enterprise MIB. The Network manager can use any SNMP compatible network management system such as SunConnect's SunNetManager and Hewlett-Packard's HP OpenView to monitor and control the DCB FT. This enables the user to integrate WAN equipment management with LAN SNMP network management systems. The embedded SNMP agent also includes Telnet implementation to allow a user to access the DCB FT terminal interface from any workstation on the network.

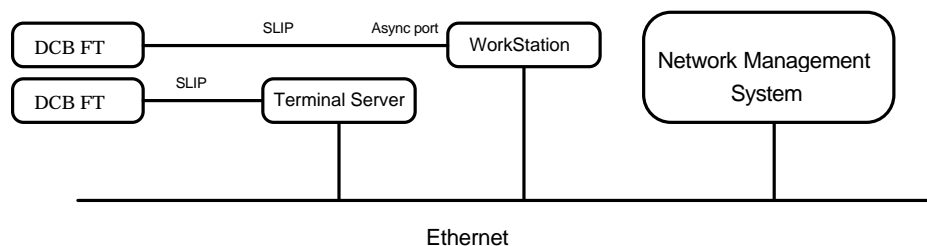


Fig 3.2

The DCB FT uses the supervisor port to provide the embedded SNMP agent functionality. Typically, a workstation can be configured to run SLIP protocol on its async ports.

Before SNMP is enabled, make sure the IP address for DCB FT is configured correctly and the communication parameters match the Terminal server port. To set the IP address, please refer to Section 4.9.7 or Section 5.16.

To enable SNMP agent, please refer to Section 4.9.6 or Section 5.16.

Once the SNMP agent is activated, the user can verify whether the DCB FT is running successfully by using the ping command to check if DCB FT is responding or not.

```
$ ping 192.1.100.45
  192.1.100.45 is alive
```

Please refer to each respective SNMP manager operation instruction to incorporate the DCB enterprise MIB into the system.

Telnet capability comes with the embedded SNMP agent. Once the SNMP agent is running, the user can use telnet and a VT100 terminal to access the DCB FT command screen. The most popular Telnet utility in the public domain is provided by NCSA. It can maintain several telnet connections simultaneously. It is recommended to set the COM port at the highest speed to produce a smoother display of data on the terminal. The DCB FT can run reliably at 38.4 Kbps.

4. FRONT PANEL OPERATION AND INDICATORS

The front panel operation utilizes a two by forty (2 X 40) characters LCD display window and four keypads labeled ESC, ENTER, left arrow '<', and right arrow '>', as shown in Figure 4.1. The ENTER key is to enable a selection, while the left and right arrow keys move the cursor left or right for proper selection. The ESC key returns operation to the next higher menu. The main menu is shown in Figure 4.2. It is the first menu displayed after power up.

NOTE

Notice that the ENTER key must be used to confirm a change. Where YES is shown at the lower right corner, it must be selected to enable a change.

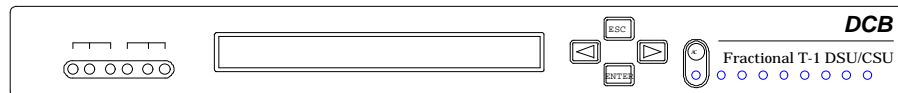


Figure 4.1 DCB FT-DSU/CSU Front Panel

The main menu consists twelve different functions as described in the following paragraphs. To select one of the functions, use left and right arrow keys to move the cursor to the function and then press the ENTER key.

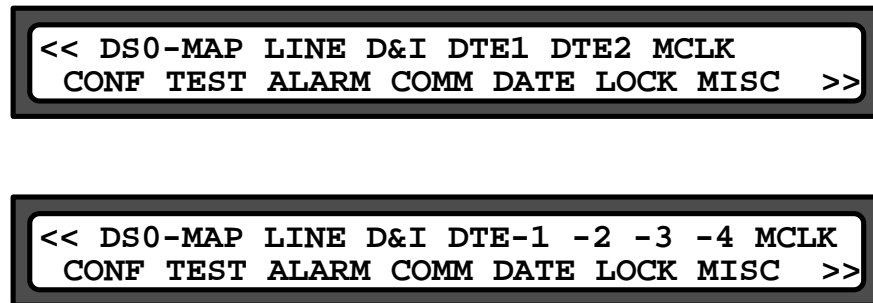


Figure 4.2 LCD Main Menu

4.1 DSO-Map Menu

The DSO-Map menu is used to configure DS0 channel assignment for the DTE and D&I ports. It is also used to program MAP1 and MAP2 as well as to enable the SWITCH function. DS0 channel assignment can be sent to the remote end using the SEND command.

4.1.1 Active Menu

The active menu shows the current active MAP (MAP1, MAP2, or SWITCH) by an '*'. To change the MAP simply move the cursor to the proper MAP or SWITCH and press ENTER. While SWITCH is selected, the current active map is shown inside the brackets.

```
DS0-MAP>ACTIVE  MAP1  MAP2  SWITCH  SEND  
MAP1  MAP2  *SWITCH<MAP1>
```

The switch function uses a proprietary ESF data link message, and is only available in ESF and ESF&T1.403 frame format mode. Otherwise, an error message (ERROR 2) will be displayed. If the far end facility acknowledges this command, an "ACK" will be shown on the LCD display. Otherwise, a "FAIL" message is displayed.

4.1.2 MAP1 / 2 Menu

```
DS0-MAP>ACTIVE  MAP1  MAP2  SWITCH  SEND  
MAP1>[iiiiiiiiiiiiiiiiiiiiiiiiiiii]
```

The MAP1 menu shows the current assigned ports for each DS0 channel. To change the designated port, press the ENTER key to a lower layer menu as follows.

```
MAP1>[_iiiiiii11ii22ii333i44ddd]  CH:01  
*IDLE DTE-1 -2 -3 -4 D&I  12: 768K
```

In the MAP1 menu, "i" indicates idle. The numbers 1, 2, 3, and 4 indicate corresponding DTE port number, and "d" indicates D&I port. In the above example, right top corner CH:01 shows the current cursor designated DS0 channel number is 01. And, right lower corner 12: 768K indicates there are 12 idle channels corresponding to 768 Kbps of total 1536 Kbps bandwidth. To change a specific DS0 channel port assignment, move cursor to a specific DS0 channel which is indicated by the cursor. Press ENTER, the cursor will move to

the lower line of the display. The selected port is indicated by an '*'. To change the port assignment, move the cursor to the desired port and press ENTER. The Cursor will return to the upper line and the LCD will show the channel number and bandwidth associated with the designated port.

4.1.3 Switch Menu

```
DS0-MAP>ACTIVE  MAP1  MAP2  SWITCH  SEND
SWITCH>MAP1  23:00-12:00  MAP2  12:00-23:00
```

The switch menu shows the current MAP1 and MAP2 schedule as in the above display. In this case, MAP1 is scheduled start at 23:00 and end at 12:00 and MAP2 is scheduled start at 12:00 and end at 23:00. To change the schedule press the ENTER key to a lower layer menu as follows.

```
SWITCH>MAP1  23:00-12:00  MAP2  12:00-23:00
          (H)U D (M)U D-(H)U D (M)U D YES
```

In the above display "U" indicates up, "D" indicates down, (H) indicates hour and (M) indicates minute. To change the START time of MAP1, move the cursor to the left (H) and (M) then select U to increase or D to decrease the START time. To change the END time of MAP1, move cursor to the right (H) and (M) and do the same. Notice that MAP2 START and END times are changed concurrently with the END and START times of MAP1. This operation must be concluded by selecting YES and pressing ENTER to enable the changes.

4.1.4 Send Menu

Selecting send and pressing ENTER will send the current working DS0 map information to the far end. This will overwrite the current far end working DS0 map. The send function uses a proprietary ESF data link message, and is only available in ESF and ESF&T1.403 frame format mode. Otherwise, an error message (ERROR 2) is displayed. If the far end facility acknowledges this command, an "ACK" is shown on the LCD display. Otherwise, a "FAIL" message is displayed.

```
DS0-MAP>ACTIVE  MAP1  MAP2  SWITCH  SEND
          "Send active ds0-map to far-end"
```

4.2 Line Menu

The line menu is used to configure the T1 line parameters such as frame format, line code, Line Build Out (LBO), yellow alarm transmission when LOF and LOS, inband loopback code recognition, FDL address code, and transmission idle code.

4.2.1 Frame Format Menu

The following display shows that D4 frame format is selected as indicated by an '*'. To change the frame type, move the cursor to the desired selection and press ENTER. ESF&T1.403 indicates ESF frame format is chosen and the facility data link message follows ANSI T1.403 standard. While ESF indicates ESF frame format is chosen and the facility data link follows AT&T PUB 54016 standard.

```
LINE>FRAME CODE LBO YEL INBAND ADDR IDLE
      *D4  ESF  ESF&T1.403
```

4.2.2 Code Format Menu

The code format menu shows the current coding scheme by an '*' preceding AMI or B8ZS. To select the coding scheme, move the cursor to the desired selection and press ENTER.

```
LINE>FRAME CODE LBO YEL INBAND ADDR IDLE
      *AMI  B8ZS
```

4.2.3 Line Build Out Menu

The Line Build Out (LBO) menu shows the current transmission LBO is 0, -7.5, or -15 dB by an '*'. To change the LBO, move the cursor to the desired selection and press ENTER.

```
LINE>FRAME CODE LBO YEL INBAND ADDR IDLE
      *0.0  -7.5  -15
```

4.2.4 Yellow Menu

The yellow menu shows the current yellow alarm transmission state when loss of signal and loss of frame synchronous is detected. The current selection is indicated by an '*'. To enable yellow alarm being automatically sent out upon loss of signal and loss of frame sync, move the cursor to ON and press ENTER. To disable transmission, move the cursor to OFF and press ENTER.

```
LINE>FRAME CODE LBO YEL INBAND ADDR IDLE
      *ON  OFF
```

4.2.5 Inband Menu

The inband menu shows the remote inband loopback diagnostics code recognition. The current selection is indicated by an '*'. To enable, move the cursor to ON and press ENTER. To disable, move the cursor to OFF and press ENTER.

```
LINE>FRAME CODE LBO YEL INBAND ADDR IDLE
      *ON  OFF
```

4.2.6 Address Menu

The address menu shows the current DCB FT address in FDL is CSU or TE when ESF frame format mode is selected. The current selection is indicated by an '*'. To change, move the cursor to the desired option and press ENTER.

```
LINE>FRAME CODE LBO YEL INBAND ADDR IDLE
      *CSU  TE
```

4.2.7 Idle Menu

The idle menu shows the transmission idle code when a DS0 channel is in idle mode. To change the idle code, press ENTER to the lower line. Then, move the cursor to ROLL-UP or ROLL-DN to roll up or roll down the idle code. Press ENTER to select the desired idle code which is shown in the lower left corner of the display. This operation must be concluded by selecting YES and pressing ENTER to enable the changes.

Note

Due to the one's density requirement, it is advised that the idle code to be set to FFh. Also, the user must program the idle code to contain at least two '1' bits. The factory default is FFh.

```
LINE>FRAME CODE LBO YEL INBAND ADDR IDLE
=FF    ROLL-UP  ROLL-DN  YES
```

4.3 D&I Menu

The D&I menu is used to configure the Drop and Insert port frame format, line code, and transmission equalizer modes.

4.3.1 Frame Format Menu

The frame format menu shows the current frame format preceded by an '*'. To change the frame format, move the cursor to the desired selection and press ENTER.

```
D&I>FFRAME  CODE  EQU
      *D4   ESF
```

4.3.2 Line Code Menu

The line code menu shows the current coding scheme preceded by an '*'. To select the coding scheme, move the cursor to the desired selection and press ENTER.

```
D&I>FRAME  CODE  EQU
      *AMI   B8ZS
```

4.3.3 Equalizer Menu

The equalizer menu indicates the current transmission equalizer by an '*'. Five distance ranges are provided from 133 to 655 feet as shown in the lower line of display. The below display shows that the current selection is 0 to 133 feet. To change the equalizer, move the cursor to the desired selection and press ENTER.

```
D&I>FRAME CODE EQU
*0-133 133-266 266-399 399-533 533-655
```

4.4 DTEn Menu

The DTEn menu is used to configure DTE port operation. Data rate, clock mode, data mode, interface type, RTS mode, and TTM (Terminal Timing Mode) can be configured.

4.4.1 Rate Menu

The rate menu indicates the current DTE data rate as either 64KxN or 56KxN bps by an '*'. To change the data rate, move the cursor to the desired selection and press ENTER.

```
DTEn>RATE CLK DATA INTERF RTS TTM
*64KxN 56KxN
```

4.4.2 Clock Menu

The clock menu indicates the current DTE clock polarity is either normal or inverted by an '*'. To change the clock polarity, move the cursor to the desired selection and press ENTER.

```
DTEn>RATE CLK DATA INTERF RTS TTM
*NORMAL INVERTED
```

4.4.3 Data Menu

The data menu shows the current DTE data polarity as either normal or inverted. To change the data polarity, move the cursor to the desired selection and press ENTER.

```
DTEn>RATE CLK DATA INTERF RTS TTM
      *NORMAL  INVERTED
```

4.4.4 Interface Menu

The interface menu shows the current DTE interface type is either RS449 or V.35. To change the interface type, move the cursor to the desired selection and press ENTER.

```
DTEn>RATE CLK DATA I NTERF RTS TTM
      *RS449   V.35
```

4.4.5 RTS Menu

The RTS menu shows the current DTE RTS operation mode as either active or permanent. To change the RTS operation mode, move the cursor to the desired selection and press ENTER.

```
DTEn>RATE CLK DATA INTERF R TS TTM
      *ACTIVE  PERMANENT
```

4.4.6 TTM Menu

The TTM menu shows the current DTE terminal timing mode as either OFF or ON. To change the terminal timing mode, move the cursor to the desired selection and press ENTER.

```
DTEn>RATE CLK DATA INTERF RTS T TM
      *OFF   ON
```

4.5 Master Clock Menu

The master clock menu is used to configure the master clock source, external clock source and clock rate.

4.5.1 Master and Second Clock Menu

The master clock menu shows the current clock source is line, internal, D&I, external, or one of the DTE ports. To change the selection, move the cursor to the desired selection and press ENTER. The upper right corner shows the current active clock is M-CLK or 2-CLK.

```
MCLK>MAST-CLK 2nd-CLK EXTERN-FRQ <2-CLK>
      *LINE INTN D&I EXTN DTE-1 -2 -3 -4
```

4.5.2 External Clock Menu

The external-clock menu shows the current external clock rate at the lower left corner of the display is 56KxN or 64KxN bps (N is 1 to 24), 1.544 Mbps, or 6.176 Mbps. To change the external clock rate, move the cursor to ROLL-UP or ROLL-DN, and press the ENTER key one step at a time. This operation must be concluded by selecting YES and pressing ENTER to enable the changes.

```
MCLK>MAST-CLK 2nd-CLK EXTERN-FRQ <2-CLK>
=1.544MBPS      ROLL-UP  ROLL-DN  YES
```

4.6 Configuration Menu

The configuration menu is used to store and retrieve system configurations.

4.6.1 Store Menu

The store menu is used to store the current working configuration into the user stored configuration by pressing ENTER.

```
CONF>STORE  RETRIEVE
      Store current configuration
```

4.6.2 Retrieve Menu

The retrieve menu is used to retrieve the user stored configuration to the current working configuration by pressing the ENTER key.

```
CONF>STORE  RETRIEVE
        Retrieve last stored configuration
```

Note

When the user stored configuration is retrieved, all loopback tests will be terminated, and the alarm queue and alarm history are reset.

4.7 Test Menu

The test menu is used to perform DTE port, Drop and Insert port, remote DTE port, and local or remote T1 line loopback tests. QRSS test, and test pattern selections are also available. If a remote loopback is in session, the front panel RLB LED is flashing green.

4.7.1 DTE Menu

```
TEST>DTE D&I RemDTE NearLB RemLB PATTERN
DTE>DTE1  DTE2
```

The DTE menu is used to perform DTE loopback tests. To initiate a DTE loopback test, move the cursor to DTE and press ENTER.

```
DTE>DTE1  DTE2
      *OFF  TO-DTE  TO-LINE
```

The current loopback state of the DTE port is indicated by an '*'. To change, first press ENTER to move the cursor to the lower line of the display. Then select OFF to end the loopback test, TO-DTE to loop the DTE incoming data back to the DTE port, or TO-LINE to loop the outgoing data back to the incoming direction.

4.7.2 D&I Menu

The D&I menu is used to perform D&I loopback tests. The current loopback test state is shown by an '*'. To change, first, press ENTER to move the cursor to the lower line of the display. Then, select OFF to end the loopback test, TO-DTE to loop the incoming data back to the D&I facility, or TO-LINE to loop the outgoing data back to the incoming direction.

```
TEST>DTE D&I RemDTE NearLB RemLB PATTERN
      *OFF  TO-DTE  TO-LINE
```

4.7.3 Remote DTE Menu

The RemDTE menu is used to control remote DTE channel loopback. Press ENTER to move to the lower layer menu.

```
TEST>DTE D&I RemDTE NearLB RemLB PATTERN
RemDTE>ACTIVATE  DEACTIVATE
```

To activate remote DTE channel loopback, first move cursor to ACTIVATE. Then, press ENTER to move cursor to the lower line of the display and select the desired port for remote loopback operation. To deactivate remote DTE loopback, first move the cursor to DEACTIVATE and do the same as above. This RemDTE test uses a proprietary message. If the remote facility responds to this command a "LOOPED" message will be shown in the lower left corner of the LCD display. Otherwise, a "NOLOOP" message will be displayed.

```
RemDTE>ACTIVATE  DEACTIVATE
      *ALL  DTE1  DTE2  DTE3  DTE4  D&I
```

4.7.4 NearLB Menu

The NearLB menu is used to control near end T1 line side loopback operation for local, payload or line loopback tests. The current near end T1 line side loopback state is shown by an '*'. To change, first press ENTER to move cursor to the lower line of the display. Then select OFF to end the loopback test, LOCAL to start local loopback test, PLB to start payload loopback test, and LLB to start line loopback test.

```
TEST>DTE D&I RemDTE NearLB RemLB PATTERN
      *OFF  LOCAL  PLB  LLB
```

4.7.5 RemLB Menu

The RemLB menu is used to activate T1 line remote loopback tests. There are three remote loopback types, inband, AT&T 54016, and T1.403. Press ENTER to move to the lower layer menu.

```
TEST>DTE D&I RemDTE NearLB RemLB PATTERN
RemLB>ACTIVATE  DEACTIVATE
```

To activate remote T1 line loopback, first move cursor to ACTIVATE. Then, press ENTER to move cursor to the lower line of the display and select the desired loopback operation. IN-BAND for remote line loopback inband coding, AT&T-P for remote payload loopback AT&T FDL coding, ANSI-P for remote payload loopback ANSI FDL coding, or ANSI-L for remote line loopback ANSI FDL coding. To deactivate remote DTE loopback, move the cursor to DEACTIVATE and do the same as above.

```
RemLB>ACTIVATE  DEACTIVATE
      *IN-BAND  AT&T-P  ANSI-P  ANSI-L
```

4.7.6 Pattern Menu

The pattern menu is used to perform QRSS diagnostics and select a variety of test patterns. Move the cursor to PATTERN and press ENTER to move to the lower layer menu.

```
TEST>DTE D&I RemDTE NearLB RemLB PATTERN
PATTERN>QRSS 3-IN-24 1-IN-8 2-IN-8 1:1
```

4.7.6.1 QRSS Menu

The QRSS menu is used to perform QRSS (Quasi Random Signal Sequence) tests. The QRSS test channel is selected by a bundle of designated DTE1, DTE2, DTE3, DTE4, D&I, idle, or all 24 DS0 channels. The current selection is indicated by an '*'. OFF indicates QRSS test is off. To change, press ENTER to move the cursor to the lower line of the display. Then move the cursor to the desired selection and press ENTER. When QRSS is activated, the lower line of the display shows the results of pattern synchronization, test DTE channel, and error count.

```
PATTERN>QRSS 3-IN-24 1-IN-8 2-IN-8 1:1
               *OFF FULL DTE1 DTE2 D&I IDLE
```

If the received signal is not a QRSS pattern, "QRSS UNSYNC" is shown in the lower left corner of the LCD display. Otherwise, "QRSS SYNC" is shown and a bit error count is displayed. The QRSS test port is shown on the LCD display as well. The User may use '>' key to inject single bit error, '<' key to reset error counter, and 'ESC' key to quit QRSS testing.

4.7.6.2 Test Pattern Menu

The test pattern is used to transmit on all 24 channels to the T1 line. Four test patterns, 3-in-24, 1-in-8, 2-in-8, and 1:1 are available. To select, move the cursor to the desired pattern and press ENTER to move cursor to the lower line of the display. To activate the pattern, move the cursor to SEND and press ENTER. To terminate, press the ESC key.

```
PATTERN>QRSS 3-IN-24 1-IN-8 2-IN-8 1:1
               *OFF SEND
```

4.8 Alarm Menu

The alarm menu is used to view the alarm queue and alarm history, to clear the alarm queue, alarm history, and alarm relay, as well as to setup alarm threshold, etc..

```
ALARM>QUEUE HISTORY CLEAR SETUP
QUEUE>1 2 3 4 5 6 7 8 9 10(Last 10 alarm
```

4.8.1 Queue Menu

The queue menu shows the alarm queue of the last 10 alarms. To view any one of the alarms in the queue, move the cursor to the number and the alarm status is shown on the lower line of the display. In the following example, the lower left corner is "AIS,D&I". The first part shows alarm type is AIS (Alarm Indication Signal), the second part shows where the alarm occurred is D&I (Drop and Insert) port. On the same line, it shows time and date when the alarm took place.

```
QUEUE>1 2 3 4 5 6 7 8 9 10(Last 10 alarm
"AIS,D&I" 18:22:34 03/02/93
```

4.8.2 History Menu

```
ALARM>QUEUE HISTORY CLEAR SETUP
HISTROY>NEXT PREVIOUS
```

The history menu shows alarm history of various types of alarms as defined in Table 3.5. To view alarm history press ENTER to move to the following display. Then, move the cursor to NEXT or PREVIOUS and press ENTER to scroll to the next or previous alarm history. In the following example, "MAST-CLK LOSS" indicates which alarm is selected, "OK" shows the current status, and "0" is the total error count.

```
HISTROY>NEXT PREVIOUS
"MAST-CLK LOSS" OK 0
```

4.8.3 Clear Menu

The clear menu is used to clear the alarm queue and history. To clear press ENTER. Otherwise, press ESC and exit without any action.

```
ALARM>QUEUE HISTORY CLEAR SETUP
                ALARMS
```

4.8.4 Setup Menu

```
ALARM>QUEUE HISTORY CLEAR SETUP
SETUP>NEXT PREVIOUS EDIT
```

The setup menu is used to set up alarm relay and auto dial-out functions. To do so, press ENTER to move to the following display. Move the cursor to NEXT or PREVIOUS and press ENTER to view each alarm type. To edit threshold level, alarm relay, and dial-out functions, move the cursor to EDIT and press ENTER.

```
SETUP>NEXT PREVIOUS EDIT
"MAST-CLK LOSS" EN RELAY-EN DIAL-EN
```

4.8.4.1 Edit Menu

The edit menu is used to set up the threshold level of each alarm type, as listed in Table 3.5, and to enable the alarm relay and auto dial-out function. Some alarms do not have a threshold level.

To change the threshold level of ES, UAS, and CS, move the cursor to the threshold level, (001) in the following display, and press ENTER. Then, move the cursor to U to increase and D to decrease the corresponding (100), (10), and (1) digits. The threshold level count is updated each time ENTER is pressed. This operation must be concluded by selecting YES and pressing ENTER to enable the changes.

```
EDIT>"UAS,D&I" 001 EN RELAY-EN DIAL-EN
      (100)U D (10)U D (1)U D YES
```

To change threshold level of BPV, move the cursor to the threshold column and press ENTER to move the cursor to the lower line of the display. The current selection is indicated by an '*'. To change, move the cursor to the desired selection and press ENTER.

```
EDIT>"BPV,LINE"10E-5 DI RELAY-DI DIAL-EN
      *5  6  7  8  9
```

EN or DI is to enable or disable the alarm error count. RELAY-EN or RELAY-DI is to enable or disable the alarm relay when alarm occurs or the error count has exceeded the threshold level. DIAL-EN or DIAL-DI is to enable or disable the dial-out function when an alarm occurs or the error count exceeds the threshold level. To change, press ENTER to move the cursor to the lower line of the display, then move the cursor to the desired function and press ENTER.

```
EDIT>"AIS,D&I" EN RELAY-DI DIAL-EN
      *DISABLE  ENABLE
```

4.9 Communication Menu

The communication menu is used to configure the supervisor port data rate, data bits, stop bits, parity bit, XON-XOFF control, interface type, and SNMP control.

Note

The user MUST use the front panel to set up the supervisor port properly before connecting a terminal or modem.

4.9.1 Baud Menu

The baud menu indicates the current supervisor port data rate by an '*'. To change the speed, move the cursor to the desired selection and press ENTER.

```
COMM>BAUD DATA STOP PAR XON INTERF IP
      *38400 19200 9600 2400 1200
```

4.9.2 Data Menu

The data menu shows the current data bit selection. To change, move the cursor to the desired selection and press ENTER.

```
COMM>BAUD DATA STOP PAR XON INTERF IP
          *8  7
```

4.9.3 Stop Menu

The stop menu shows the current stop bits setting. To change stop bits, move the cursor to the desired selection and press ENTER.

```
COMM>BAUD DATA STOP PAR XON INTERF IP
          *1  2
```

4.9.4 Parity Menu

The parity menu shows the current parity setting. To change data parity, move the cursor to the desired selection and press ENTER.

```
COMM>BAUD DATA STOP PAR XON INTERF IP
          *NONE  EVEN  ODD
```

4.9.5 XON Menu

The XON menu shows the current XON-XOFF flow control setting. To change, move the cursor to the desired selection and press ENTER.

```
COMM>BAUD DATA STOP PAR XON INTERF IP
          *OFF  ON
```

4.9.6 Interface Menu

The interface menu shows the current supervisor port interface type, terminal, modem, or SNMP. To change, move the cursor to the desired option and press ENTER. In modem mode, a modem initialization routine is run to establish the connection. The initialization routine must be run each time the modem is installed.

```
COMM>BAUD DATA STOP PAR XON INTERF IP
      *TERMINAL  MODEM
```

Select SNMP-SLIP to enable the embedded SNMP agent operation.

```
COMM>BAUD DATA STOP PAR XON INTERF IP
      TERMINAL  MODEM *SNMP-SLIP
```

4.9.7 IP Menu

The IP menu allows the user to modify the device IP address and the IP address used by the SNMP trap message.

```
COMM>BAUD DATA STOP PAR XON INTERF IP
IP>MY-IP-ADDR  TRAP-IP-ADDR
```

Each IP address can be modified by moving the cursor to each position and selecting a number. After making all changes, select YES to save the changes.

```
IP>MY-IP-ADDR  TRAP-IP-ADDR
My IP Address = 192.009.200.010
```

```
My IP Address = 192.009.200.010      YES
0123456789
```


4.10 Date Menu

The date menu shows the current date and time. Use U to increase and D to decrease the corresponding (M) for month, (D) for day, (Y) for year, (H) for hour, (M) for minute, and (S) for second. This operation must be concluded by selecting YES and pressing ENTER to enable the changes.

```
DATE>03/16/93 18:30:23
(M)U D(D)U D(Y)U D(H)U D(M)U D(S)U D YES
```

4.11 Lock Menu

The lock menu is used to control LCD panel operation. Normally, the front panel provides configuration change capability. This capability can be disabled by selecting lock menu to disable the front panel. With the front panel locked, the user can still view the configuration and line status information.

```
LOCK>front panel and password
      *DISABLE  ENABLE
```

To disable the front panel operation lock, the user must enter the password correctly. Use left or right to pick the character. There are 66 characters to choose from. Password modification can only be done using a terminal from the supervisor port.

```
Enter Password: _____ YES
0123456789ABCDEFGHIJKLMNPOQRSTUVWXYZ!"#$
```

```
Enter Password: _____ YES
%&'()*+,-,/:;<=>?@[ ]^_`{|}
```

4.12 Miscellaneous Menu

4.12.1 Error Code Menu

The error-code menu shows error codes and their description as in the following example. Table 3.8 lists error codes and their meaning.

```
MISC>_ERROR_CODE  PERFORMANCE STATUS
ERROR_CODE>1  2  3  4  5  6  7  8  9  10  11
```

```
ERROR-CODE>1  2  3  4  5  6  7  8  9  10
ERR01:A loopback is in effect
```

4.12.2 Performance Menu

The performance menu shows the total performance registers of user group and resets the registers.

```
MISC>ERROR_CODE  _PERFORMANCE STATUS
PERF>USER RESET
```

User performance registers are shown and updated every second.

```
USER>ES    UAS    BES    SES    CS  LOFC    BPV
      0      1      0      0      0    0      0
```

Select reset menu to reset user performance registers. Enter YES to confirm the action.

```
PERF>USER _RESET
      Clear Performance Data ? YES
```

4.12.3 Status Menu

The status menu shows the line and D&I status.

```
STATUS>LINE  D&I
        show Line Status
```

The status is shown and updates every second. An '*' marks the status. The following example shows Loss of Signal is detected.

```
LINE> LOS  LOF  RED  YEL  AIS  BPV
        *
```

4.13 Indicators

The front panel has 9 LEDs for operation and error indications. Four DTE LEDs are for DTE1, DTE2, DTE3, and DTE4 port. D&I is for T1 Drop and Insert port. LINE is for DS1 network line port. RLB is for Remote Loopback indication. POWER is for system power indication. ACO is for Alarm Cut-Off indication.

Each LED has three colors, green, amber, and red. The indication is either off, steady on, or flashing. Table 4.1 lists each LED and its color state and meaning.

Table 4.1 Front-Panel LED Table

LED	Color	Meaning
POWER	Green Flashing Green Red	Powered on and operational Software download in progress Self-Test failure
LINE	Off Flashing Green Green Amber Flashing Amber Red	No T1 line card exists A line-side loopback is active T1 line frame synchronous (Normal) Received yellow alarm from T1 line Received AIS from T1 line Loss of Frame Sync (LOFS) or Loss of Signal (LOS)
D&I	Off Flashing Green Green Amber Flashing Amber Red	D&I port is not assigned any DS0 channel A D&I loopback is active D&I frame synchronous (Normal) Received yellow alarm from D&I port Received AIS from D&I port Loss of Frame Sync (LOFS) or Loss of Signal (LOS)
DTE1,2,3,4	Off Flashing Green Green Red	DTE port is not assigned any DS0 channel DTE side loopback is active RTS is asserted to DTE port DTE port RTS loss or clock loss in TTM
RLB	Off Flashing Green	Remote loopback is inactive Remote loopback is active
ACO	Off Red	Alarm Relay inactive Alarm Relay active

5. SUPERVISOR PORT

The DCB FT-DSU/CSU provides comprehensive report and enhanced configuration capability through the supervisor port. A VT100 type terminal or a modem can be connected to the supervisor port on the back of unit. Using single-character commands and arrow keys, the DCB FT can be configured and monitored. The single-character command is not case sensitive. On each screen, the available commands and the configurable fields are highlighted. Alarm messages are also sent to the supervisor port and are shown on the top of the screen in blinking mode. The main menu is displayed upon power up.

Note

On the upper right corner of the screen, a time-of-day display indicates the time the current screen was shown. The user may press any key other than ESC to update the display.

```
DCB-FT CSU/DSU V1.5          === Main Menu ===          10:50:45 01/11/94

[DISPLAY]                      [SETUP]
1  -> 1-Hour Perf. Report
2  -> 24-Hour Perf. Report
A  -> Line Availability
C  -> DCB-FT System Setup
D  -> DCB-FT Description
E  -> ESF Error Count
H  -> Alarm History
I  -> DCB-FT Status
Q  -> Alarm Queue              [CLEAR & RESET]
[ACCESS]
F  -> Log Off [SETUP] and
    [CLEAR & RESET] menu
O  -> Log On [SETUP] and
    [CLEAR & RESET] menu

>>Enter Command ?
```

Figure 5.1 Terminal Main Menu -1

If the terminal screen is illegible, press "Enter↵" key and "Esc" key alternately to bring out the main menu. If all efforts fail, check if the right cable is used, and if the supervisor port parameter setting is matched with the terminal using the front panel "COMM" command. See Section 4.9.

The main menu consists of four groups of commands, Display, Access, Setup and Clear & Reset. Initially, only Display and Access commands are available. To enable Setup and Clear commands, the user has to log on using the "O" command.

```

DCB-FT CSU/DSU V1.5          === Main Menu ===          10:51:45 01/11/94

[DISPLAY]
1  -> 1-Hour Perf. Report
2  -> 24-Hour Perf. Report
A  -> Line Availability
C  -> DCB-FT System Setup
D  -> DCB-FT Description
E  -> ESF Error Count
H  -> Alarm History
I  -> DCB-FT Status
Q  -> Alarm Queue
[ACCESS]
F  -> Log Off [SETUP] and
    [CLEAR & RESET] menu
O  -> Log On [SETUP] and
    [CLEAR & RESET] menu

[SETUP]
L  -> Loopback Test
M  -> Alarm Setup
P  -> Password Setup
R  -> Retrieve Last Stored Configuration
S  -> System Setup
T  -> Change Date and Time
V  -> Store Current Configuration
W  -> Send Active DSO-MAP to Far-end
N  -> Synchronize Far-end System Time
[CLEAR & RESET]
B  -> Reset Alarm Relay
U  -> Clear Alarms
X  -> Clear ESF Error Count
Y  -> Clear Performance Data
Z  -> System Reset

>>Enter Command ?

```

Figure 5.2 Terminal Main Menu -2

5.1 One Hour Performance Report

To show 1 hour performance report, enter "1". A prompt asking for the type of report is shown at the bottom of the screen. Four choices are available.

```
>>Select Register Type? *USER LINE D&I FAR-END ( <- , -> , ENTER )
```

Note

Far-end operation is only accessible in ESF frame format mode.

Use the cursor keys to select the desired type of report and press the "Enter↵" key to view the report as shown below.

```
=== 1-Hour Performance Report ===                                10:52:45 01/11/94
USER D4 AMI DS-1
-- Valid Seconds in Current 15-Min Interval : 103 seconds
      (ES)    (UAS)    (BES)    (SES)    (CSS)    (LOFC)
Current 15-Min Interval :      0      0      0      0      0      0
1st Nearest 15-Min Interval :    0      0      0      0      0      0
2nd Nearest 15-Min Interval :    0      0      0      0      0      0
3rd Nearest 15-Min Interval :    0      0      0      0      0      0
4th Nearest 15-Min Interval :    0      0      0      0      0      0
-- Valid 15-Min Intervals in Current 24-Hour Interval : 96
      (ES)    (UAS)    (BES)    (SES)    (CSS)    (LOFC)
Current 24-Hour Interval :      0      0      0      0      0      0

<< Press ESC key to return to Main Menu >>
```

Second line of the screen shows the type of the performance register set, frame format type, line code type and line type of current report.

5.2 Twenty-Four Hour Performance Report

To show the 24 hour performance report, enter "2". A prompt asking for the type of report and performance data is shown at the bottom of the screen.

```
>>Select Register Type? *USER LINE D&I FAR-END ( <- , -> , ENTER )
>>Select Perf Para.? *ES UAS BES SES CS LOFC ( <- , -> , ENTER )
```

Use the cursor keys to select the desired type of report and press the "Enter↵" key to view the report as shown below.

```
=== 24-Hour Performance Report ===                                10:53:45 01/11/94
USER ES D4 AMI DS-1
-- Valid Seconds in Current 15-Min Interval : 105 seconds
      (ES)    (UAS)    (BES)    (SES)    (CSS)    (LOFC)
Current 15-Min Interval :          0          0          0          0          0
-- Valid 15-Min Intervals in Current 24-Hour Interval : 96
      (ES)    (UAS)    (BES)    (SES)    (CSS)    (LOFC)
Current 24-Hour Interval :          0          0          0          0          0
-- USER, ES, Last 96 15-Min Interval :
01-08 >    0    0    0    0    0    0    0
09-16 >    0    0    0    0    0    0    0
17-24 >    0    0    0    0    0    0    0
25-32 >    0    0    0    0    0    0    0
33-40 >    0    0    0    0    0    0    0
41-48 >    0    0    0    0    0    0    0
49-56 >    0    0    0    0    0    0    0
57-64 >    0    0    0    0    0    0    0
65-72 >    0    0    0    0    0    0    0
73-80 >    0    0    0    0    0    0    0
81-88 >    0    0    0    0    0    0    0
89-96 >    0    0    0    0    0    0    0
<< Press ESC key to return to Main Menu >>
```

Second line of the screen shows the type of the performance register set, performance register, frame format type, line code type and line type of current report.

5.3 Line Availability

To show the line availability, enter "A". The information, based on user performance register set, includes the valid seconds, available seconds, unavailable seconds and the line availability.

```
=== Line Availability during Last 24-Hour ===                        10:54:45 01/11/94
Valid seconds : 86400 seconds
Available Seconds : 86400 seconds
Unavailable Seconds : 0 seconds
Line Availability : 100.0 %
<< Press ESC key to return to Main Menu >>
```


5.4 System Setup

To display the system configuration, enter "C". A prompt asking for the type of report is shown at the bottom of the screen.

```
>>Select Type? *LOCAL STORED FAR-END ( <- , -> , ENTER )
```

Use the cursor keys to select the desired configuration and press the "Enter,↵" key to view the information.

```
===      DCB-FT System Setup ===      10:55:45 01/11/94
LOCAL
DS0-MAP:ACTIVE MAP = SWITCH  CURRENT MAP=MAP1
      MAP1=[111122222233444444ddiiii]  MAP2=[111111111111dddddiddiiii]
      SWITCH TIME = MAP1 00:00-12:00  MAP2 12:00-00:00
LINE:FRAME=D4      CODE=AMI  LBO=0.0  YEL=ON  INBAND=ON  ADDR=CSU  IDLE=FF
D&I :FRAME=D4      CODE=AMI  EQU=0-133  <MAP1> 2: 128K <MAP2> 8: 512K
      (RATE) <MAP1>  <MAP2>  (CLOCK) (DATA)  (INTERFACE) (RTS)  (TTM)
DTE1: 64K      4: 256K 12: 768K  NORMAL  NORMAL  RS449  ACTIVE  OFF
DTE2: 56K      6: 336K 0: 0K  NORMAL  NORMAL  RS449  ACTIVE  OFF
DTE3: 64K      2: 128K 0: 0K  NORMAL  NORMAL  RS449  ACTIVE  OFF
DTE4: 64K      6: 384K 0: 0K  NORMAL  NORMAL  RS449  ACTIVE  OFF
MAST-CLOCK: LINE      2nd-CLK:LINE      EXT-FREQ: 1.544Mbps  CURRENT=MAST-CLOCK
RS-232 PORT: BAUD=9600 DATA=8 STOP=1 PAR=NONE XON-XOFF=OFF INTERF=TERMINAL
DIAL-OUT SETUP:
      PRIMARY DIALSTRING: ATDT19085551212
      START TIME 08:00      STOP TIME 07:59
      SECONDARY DIALSTRING: ATDT19085551234
      START TIME 08:00      STOP TIME 07:59
      INACTIVITY TIMEOUT: 0 MINUTES
DEVICE NAME: DCB-FT-01
MY IP ADDRESS :192.009.200.010  COMMUNITY NAME: public  (12 char)
TRAP IP ADDRESS:255.255.255.255

<< Press ESC key to return to Main Menu >>
```

5.5 System Description

To display the system description, enter "D". A prompt asking for the type of system description is displayed at the bottom of the screen.

```
>>Select Type? *LOCAL FAR-END ( <- , -> , ENTER )
```

Use the cursor keys to select the desired information and press the "Enter.↵" key to view the data.

```
=== DCB-FT Description ===                                10:56:45 01/11/94
LOCAL
Port Configuration : DTE12-D&I-DS1
Serial Number : 2031157
Main Board Version : 1.0
ROM Version : DCB Version 1.3 10/30/93

<< Press ESC key to return to Main Menu >>
```

5.6 ESF Error Count

To show the ESF error count, enter "E". A prompt asking for the type of report is displayed at the bottom of the screen.

```
>>Select Register Type? *USER LINE D&I FAR-END ( <- , -> , ENTER )
```

Use the cursor keys to select the desired information and press the "Enter.↵" key to view the data.

```
=== ESF Error Count ===                                10:57:07 01/11/94
USER
Start Time : 15:30:58 04/25/93
ESF Errors : 10

<< Press ESC key to return to Main Menu >>
```

5.7 Alarm History

To show the alarm history, enter "H". A prompt asking for the type of alarm history is displayed at the bottom of the screen.

```
>>Select Type? *LOCAL FAR-END ( <- , -> , ENTER )
```

Use the cursor keys to select a desired location and press the "Enter.␣" key to view the data as shown below.

```
=== Alarm History Report ===                                10:56:38 01/11/94
LOCAL Start Time = 10:50:51 10/27/93
(ALARM-TYPE) (THRESHOLD) (CUR-STA) (COUNT) (ALARM) (RELAY) (DIALOUT)
MAST-CLK LOSS                OK          0    ENABLE    ENABLE    ENABLE
YEL,LINE                     OK          0    ENABLE    ENABLE    ENABLE
AIS,LINE                     OK          0    ENABLE    ENABLE    ENABLE
LOS,LINE                     OK          0    ENABLE    ENABLE    ENABLE
LOF,LINE                     OK          0    ENABLE    ENABLE    ENABLE
BPV,LINE      10E-5          OK          0    ENABLE    ENABLE    ENABLE
ES,LINE          1          OK          0    ENABLE    ENABLE    ENABLE
UAS,LINE          1          OK          0    ENABLE    ENABLE    ENABLE
CS,LINE          1          OK          0    ENABLE    ENABLE    ENABLE
DTE1 ALARM                  OK          0    ENABLE    ENABLE    ENABLE
DTE2 ALARM                  OK          0    ENABLE    ENABLE    ENABLE
DTE3 ALARM                  OK          0    ENABLE    ENABLE    ENABLE
DTE4 ALARM                  OK          0    ENABLE    ENABLE    ENABLE
YEL,D&I                     OK          0    ENABLE    ENABLE    ENABLE
AIS,D&I                     OK          0    ENABLE    ENABLE    ENABLE
LOS,D&I                     OK          0    ENABLE    ENABLE    ENABLE
LOF,D&I                     OK          0    ENABLE    ENABLE    ENABLE
BPV,D&I      10E-5          OK          0    ENABLE    ENABLE    ENABLE
ES,D&I          1          OK          0    ENABLE    ENABLE    ENABLE
UAS,D&I          1          OK          0    ENABLE    ENABLE    ENABLE

<< Press ESC key to return to Main Menu >>
```

5.8 System Status

To display the DCB FT status, enter "I". A prompt asking for the type of system status report is displayed at the bottom of the screen.

```
>>Select Type? *LOCAL FAR-END ( <- , -> , ENTER )
```

Use the cursor keys to select a desired location and press the "Enter.␣" key to view the information.

```
=== DCB-FT Status Display ===                               10:58:46 01/11/94
LOCAL
-- LINE --
  LOS      : No
  LOF      : No
  RCV AIS   : No
  RCV YEL   : No
  XMT AIS   : No
  XMT YEL   : YES
  BPV ERROR COUNT : 1536
  ES  ERROR COUNT : 2376
-- DTEn --
  DTE1 RTS LOSS : No
  DTE2 RTS LOSS : No
  DTE3 RTS LOSS : No
  DTE4 RTS LOSS : No
  DTE1 CLOCK LOSS : No
  DTE2 CLOCK LOSS : No
  DTE3 CLOCK LOSS : No
  DTE4 CLOCK LOSS : No
-- D&I --
  LOS      : No
  LOF      : No
  RCV AIS   : No
  RCV YEL   : No
  XMT AIS   : NO
  XMT YEL   : NO
  BPV ERROR COUNT : 0
  ES  ERROR COUNT : 0
-- TEST --
  PATTERN TRANSMITTED : OFF
  QRSS CHANNEL        : OFF
  NEAR-END LOOPBACK   : OFF
  DTE1 LOOPBACK       : TO-DTE
  DTE2 LOOPBACK       : OFF
  DTE3 LOOPBACK       : TO-LINE
  DTE4 LOOPBACK       : OFF
  D&I LOOPBACK        : TO-LINE

<< Press ESC key to return to Main Menu >>
```

In the example, the DTE1 port is looping back DTE port signal to DTE, the DTE3 and D&I ports are looping back the incoming PCM signal to the line. Yellow alarm is sending out to the line.

5.9 Alarm Queue

To display the alarm queue, enter "Q".

```
=== Alarm Queue ===                                           10:59:12 01/11/94
1st nearest alarm -- "LOS,D&I      " 08:13:22 04/29/93
2nd nearest alarm -- "AIS,LINE     " 11:37:31 04/28/93
----- Page 1 -----

<< Press ESC key to return to Main Menu >>
```

The last 40 alarm entries are shown on the terminal as above in two pages of 20 entries each. If there are more than 20 entries, press any key other than "ESC" to view the 2nd page. To return to main menu, press the "ESC" key.

5.10 Logoff

After completing the system setup or clearing history data, the user should log off to prevent accidentally changing the system configuration. Enter "F" to logoff.

5.11 Logon

To show a full menu, the user must log on. If the password option is enabled, a prompt asking for the password is displayed.

```
==>> Enter Password ?
```

The full menu is shown only after a valid password is entered. Otherwise the user is asked to enter the correct password again.

```
>>Invalid Input of Password ! Try Again ?[y/n]
```

5.12 Loopback Test Menu

To enter the loopback test menu, enter "L". To initiate the loop back test, select the desired option and press the "Enter↵" key to start. The loop back tests can be performed simultaneously on the T1 line, DTE ports and D&I port. Information about the loop back test is shown at the bottom of the screen,.

```
=== Loopback Test Menu ===                                     11:02:12 01/11/94
  ARROW KEYS : CURSOR MOVE  ,  ENTER : SELECT

- NEAR-END LOOPBACK : *OFF  LOCAL  PLB  LLB
- DTE1 LOOPBACK      : *OFF  TO-DTE TO-LINE
- DTE2 LOOPBACK      : *OFF  TO-DTE TO-LINE
- D&I LOOPBACK       : *OFF  TO-DTE TO-LINE
- SEND LOOPBACK ACTIVATE CODE TO FAR-END :
  *IN-BAND AT&T-P ANSI-P ANSI-L
- SEND LOOPBACK DEACTIVATE CODE TO FAR-END :
  *IN-BAND AT&T-P ANSI-P ANSI-L
- SEND CHANNEL LOOPBACK ACTIVE CODE TO FAR-END :
  *ALL DTE1 DTE2 DTE3 DTE4 D&I
- SEND CHANNEL LOOPBACK DEACTIVATE CODE TO FAR-END :
  *ALL DTE1 DTE2 DTE3 DTE4 D&I
- SEND QRSS :
  *OFF LINE DTE1 DTE2 D&I IDLE
- SEND TEST PATTERN :
  *OFF 3-IN-24 1-IN-8 2-IN-8 1:1

Status :
<< Press ESC key to return to Main Menu >>
```

To initiate QRSS test, choose the test port and press "Enter↵". The status shows the result of the test continuously with the bit error count, error seconds, and elapsed seconds until the "Esc" key is pressed.

```
Status :  QRSS SYNC      ,CHANNEL=FULL,BIT ERR= 65535
          ERROR SECONDS= 20          ,ELAPSED SECONDS= 139027
```

To transmit the test pattern continuously, choose one of the 4 patterns and press "Enter". Press the "Esc" key to stop the test.

```
Status : "Transmitting 3-in-24 test pattern"
```

5.13 Alarm Setup Menu

To enter the alarm setup menu, enter "M". A prompt asking for the type of alarm setup menu is shown at the bottom of the screen.

```
>>Select Type? *LOCAL FAR-END ( <- , -> , ENTER )
```

For each type of alarm, three setup choices are available. "ALM" is to set whether this alarm register counter is enabled or disabled. "DIAL" and "RELAY" are to activate or deactivate the alarm reporting function. When the alarm exceeds its threshold, DIAL is to dial out from the supervisor port, and RELAY is to engage the alarm relay.

```
=== Local Alarm Setup ===                                     11:48:48 01/11/94
ARROW KEYS : CURSOR MOVE , TAB : ROLL-UP , ROLL-DOWN

(TYPE)      (THRESHOLD) (ALM) (RELAY) (DIAL)  (TYPE) (THRESHOLD) (ALM) (RELAY) (DIAL)
MAST-CLK LOSS          DIS  DIS  DIS  DTE2 ALARM          EN  EN  DIS
YEL,LINE              EN  EN  EN  DTE3 ALARM          EN  EN  EN
AIS,LINE              EN  EN  EN  DTE4 ALARM          EN  EN  EN
LOS,LINE              EN  EN  EN  YEL,D&I            EN  EN  EN
LOF,LINE              EN  EN  EN  AIS,D&I            EN  EN  EN
BPV,LINE      10E-5    EN  EN  EN  LOS,D&I            EN  EN  EN
ES,LINE            1    EN  EN  EN  LOF,D&I            EN  EN  EN
UAS,LINE            1    EN  EN  EN  BPV,D&I      10E-5    EN  EN  EN
CS,LINE            1    EN  EN  EN  ES,D&I            1    EN  EN  EN
DTE1 ALARM          EN  EN  EN  UAS,D&I            1    EN  EN  EN

<< Press ESC key to return to Main Menu >>
```

5.14 Password Setup Menu

To change the password setup, enter "P". A prompt asking for the desired action is shown.

```
=== Password Setup ==                                         10:42:58 01/11/94
Password ? *DISABLE  ENABLE  CHANGE ( <- , -> , ENTER )
```

To enable the password, select "ENABLE". The previously entered password is used. The password itself is not case sensitive. If you want to select your own password, select "CHANGE". Prompts asking for the original password and new password are shown.

```
Enter CURRENT Password:
Enter NEW Password:
Re-Enter NEW Password:
```

5.15 Retrieve Last Stored Configuration

In case configuration changes cause some unexpected effects, enter "R" to restore the user stored configuration. The system will prompt the following message. Enter "Y" to retrieve, and "N" to quit.

```
=>> Retrieve Last Stored Configuration (Y/N)?
```

5.16 System Setup Menu

Enter "S" to show the system configuration. A prompt asking for the type of system setup menu may appear at the bottom of the screen.

```
>>Select Type? *LOCAL FAR-END ( <- , -> , ENTER )
```

The cursor keys are used to select the field to be changed. As the cursor moves from field to field, the second line on the screen shows the available input for the field. After making all the changes, press the "Esc" key and answer yes to make the changes take effect.

```
=== Local System Setup ===                                     10:45:26 01/11/94
DS0-MAP:ACTIVE MAP = MAP1                                     CH:02
      MAP1=[idd11112222223344444444iii]      MAP2=[idddddddd1111111111111111iii]
      SWITCH TIME = MAP1 00:00-12:00 MAP2 12:00-00:00
LINE:FRAME=D4      CODE=AMI LBO=0.0      YEL=ON INBAND=ON ADDR=CSU IDLE=FF
D&I :FRAME=D4      CODE=AMI EQU=0-133    <MAP1> 2: 128K <MAP2> 8: 512K
      (RATE) <MAP1> <MAP2> (CLOCK) (DATA) (INTERFACE) (RTS) (TTM)
DTE1: 64K 4: 256K 12: 768K NORMAL NORMAL RS449 ACTIVE OFF
DTE2: 64K 6: 384K 0: 0K NORMAL NORMAL RS449 ACTIVE OFF
DTE3: 56K 2: 112K 0: 0K NORMAL NORMAL RS449 ACTIVE OFF
DTE4: 64K 6: 384K 0: 0K NORMAL NORMAL RS449 ACTIVE OFF
MAST-CLOCK: INTERN 2nd-CLOCK:LINE EXT-FREQ: 1.544Mbps CURRENT=MAST-CLOCK
RS-232 PORT: BAUD=9600 DATA=8 STOP=1 PAR=NONE XON-XOFF=OFF INTERF=TERMINAL
DIAL-OUT SETUP:
  PRIMARY DIALSTRING: ATDT (32 char)
    START TIME 08:00 STOP TIME 07:59
  SECONDARY DIALSTRING: ATDT (32 char)
    START TIME 08:00 STOP TIME 07:59
  INACTIVITY TIMEOUT: 000 MINUTES
DEVICE NAME: DCB-FT-01 (20 char)
MY IP ADDRESS :192.009.200.010 COMMUNITY NAME: public (12 char)
TRAP IP ADDRESS:255.255.255.255

<< Press ESC key to return to Main Menu >>
```

5.17 Change Date and Time

Enter "T" to change system date and time. The date and time are shown with the cursor on the hour field. Uses arrow keys to select the field to be changed and enter the correct information.

```
22:17:02 05/05/93 ( <- , -> : CURSOR MOVE , 0~99 : INPUT )
```

Press the "Esc" key after making the necessary changes and confirm the changes with "Y". Input is checked for validation. Invalid information is discarded and the original value is shown.

```
=>>Save DATE & TIME Setup (Y or N) ?
```

5.18 Store Current Configuration

Enter "V" to save the working configuration to the user stored configuration so that it can be retrieved using the "R" command. The system will prompt with the following message. Enter "Y" to store, and "N" to quit.

```
=>> Store Current Configuration (Y/N)?
```

5.19 Send Active DS0 Map to Far-end

Enter "W" to send the current active DS0 map information to the far-end. Since the notification procedure is implemented in proprietary format, only DCB FT product family would interpret the message correctly. The unit has to be in ESF frame format mode to send the active DS0 map to the far-end. An "ACK" or "FAIL" is displayed depending on whether the far-end unit accepts the DS0 map or not.

```
=>> Send Active DS0-MAP to Far-end ... ACK
```

5.20 Synchronize Far-end System Time

Enter "N" to synchronize the far-end system time's minutes and seconds. Due to the time zone difference, the hour is not updated by this command. Since the notification procedure is implemented in proprietary format, only DCB FT product family would interpret the message correctly. An "ACK" is shown if the far-end acknowledges this command; otherwise, a "FAIL" is shown.

```
=>> Synchronize Far-end System Time .ACK
```


5.21 Reset Alarm Relay

Enter "B" to reset the ACO LED and the alarm relay.

5.22 Clear Alarms

Enter "U" to clear alarm history and queues.

5.23 Clear ESF Error Count

Enter "X" to reset user and D&I ESF error counter. The ESF error count start time is reset.

5.24 Clear Performance Data

Enter "Y" to reset user and D&I performance registers. This command does not affect the contents of the performance register set.

5.25 System Reset

Enter "Z" to reset the system without powering down the unit. Upon receiving this command, the system will restart from the init routine and perform all power-up diagnostics procedures. The system will prompt with the following message and the user must enter a valid password to execute this command.

```
==>> Enter Password ?
```

6. INTERFACE SIGNALS AND CABLING

6.1 Port Interface

6.1.1 DTE Port Interface (DB-25S)

<u>Pin</u>	<u>Signal</u>	<u>In/Out</u>
1	Cable Shield	-----
2	Transmit Data	IN
3	Receive Data	OUT
4	Request to Send	IN
5	Clear to Send	OUT
6	Data Set Ready	OUT
7	Signal Ground	-----
8	Data Carrier Detect	OUT
9	Receive Clock Return	
10	Data Carrier Detect Return	
11	External Clock Return	
12	Transmit Clock Return	
13	Clear to Send Return	
14	Transmit Data Return	
15	Transmit Clock	OUT
16	Receive Data Return	
17	Receive Clock	OUT
18	Local Loopback	IN
19	Request to Send Return	
22	Data Set Ready Return	
24	External Clock	IN
25	Test Mode	OUT

6.1.2 Supervisor Port Interface (DE-9P)

<u>Pin</u>	<u>Signal</u>	<u>In/Out</u>
1	Data Carrier Detect	IN
2	Receive Data	IN
3	Transmit Data	OUT
4	Data Terminal Ready	OUT
5	Signal Ground	-----

6.1.3 T1 Line Interface (DA-15P)

<u>Pin</u>	<u>Signal</u>	<u>In/Out</u>
1	Transmit Tip	OUT
2	Transmit Ground	----
3	Receive Tip	IN
4	Receive Ground	----
9	Transmit Ring	OUT
11	Receive Ring	IN

6.1.4 Drop & Insert Interface (DA-15S)

<u>Pin</u>	<u>Signal</u>	<u>In/Out</u>
1	Transmit Tip	IN
2	Transmit Ground	----
3	Receive Tip	OUT
4	Receive Ground	----
9	Transmit Ring	IN
11	Receive Ring	OUT

6.1.5 Alarm Relay Connector

<u>Pin</u>	<u>Signal</u>
1	Alarm Fuse Normally Closed
2	Alarm Fuse Common
3	Alarm Fuse Normally Open
4	Alarm Relay Normally Closed
5	Alarm Relay Common
6	Alarm Relay Normally Open

6.2 Cables

6.2.1 DTE RS-449 Conversion Cable

<u>DB-25P</u>	<u>Signal</u>	<u>DC37S</u>
1	Cable Shield	1
2	Transmit Data	4
3	Receive Data to DTE	6
4	RTS (Request to Send)	7
5	CTS (Clear to Send)	9
6	DSR (Data Set Ready)	11
7	Signal Ground	19
8	Data Carrier Detect	13
9	Receive Clock Return	26
10	Data Carrier Detect Return	31
11	External Clock Return	35
12	Transmit Clock Return	23
13	Clear to Send Return	27
14	Transmit Data Return	22
15	Transmit Clock	5
16	Receive Data Return	24
17	Receive Clock	8
18	Local Loopback	10
19	Request to Send Return	25
20	Unassigned	12
22	Data Set Ready Return	29
24	External Clock	17
25	Test Mode	18

6.2.2 DTE RS-232 Conversion Cable

<u>DB-25P</u>	<u>Signal</u>	<u>DB-25S</u>
2	Transmit Data	2
3	Receive Data	3
4	Request to Send	4,20
5	Clear to Send	5
6	Data Set Ready	6
7	Signal Ground	7
8	Data Carrier Detect	8
15	Transmit Clock	15
17	Receive Clock	17
9,10,12,13,14,16,19,22	Common to pin 7	

6.2.3 DTE V.35 Conversion Cable

<u>DB-25P</u>	<u>Signal</u>	<u>M34S</u>
1	Cable Shield	A
2	Transmit Data	P
3	Receive Data to DTE	R
4	RTS (Request to Send)	C
5	CTS (Clear to Send)	D
6	DSR (Data Set Ready)	E
7	Signal Ground	B
8	Data Carrier Detect	F
9	Receive Clock Return	X
11	External Clock Return	W
12	Transmit Clock Return	AA
14	Transmit Data Return	S
15	Transmit Clock	Y
16	Receive Data Return	T
17	Receive Clock	V
20	Data Terminal Ready	H
24	External Clock	U

6.2.4 Supervisor Port Cables

To a Terminal

DE-9S	DB-25P
1	4
2	2
3	3
4	8, 5
5	7

To a PC Com Port

DE-9S	DE-9S	DB-25S
1	4	or 20
2	3	or 2
3	2	or 3
4	1	or 8
5	5	or 7

To a Modem

DE-9S	DB-25P
1	8
2	3
3	2
4	4, 20
5	7

6.2.5 Line Port to Telco RJ-48C Jack

<u>DA15S</u>	<u>Signal</u>	<u>RJ48C</u>
1	Transmit Tip	4
2	Transmit Ground	
3	Receive Tip	1
4	Receive Ground	
9	Transmit Ring	5
11	Receive Ring	2

6.2.6 D&I Port to Telco RJ-48C Jack

<u>DA15P</u>	<u>Signal</u>	<u>RJ48C</u>
1	Transmit Tip	1
2	Transmit Ground	
3	Receive Tip	4
4	Receive Ground	
9	Transmit Ring	2
11	Receive Ring	5

6.2.7 D&I Port to Line Port

<u>DA15P</u>	<u>Signal</u>	<u>DA15S</u>
1	Transmit Tip	1
2	Transmit Ground	2
3	Receive Tip	3
4	Receive Ground	4
9	Transmit Ring	9
11	Receive Ring	11

7. TROUBLESHOOTING

7.1 Self Test

At system power up, a complete self-test routine is run to check all I/O ports, read/write memory, and data paths to validate system integrity. During system self test, "SELF TEST" is displayed on the upper line of the LCD display. Also, the software release version and date code are shown on the lower line of the display. If any error is found, "FAIL" is displayed in the upper right corner of the display and a dedicated error message is shown on the lower line. Also, the user may press "ESC", left arrow "<", right arrow ">", and "ENTER" in this order to read a specific error code. If no error is found, the display will show "PASS" in the upper right corner followed by a Main Menu as shown in Figure 4.2.

7.2 Diagnostics

A 20-bit Quasi-Random Signal Sequence (QRSS) register is used by the DCB FT-DSU/CSU. The QRSS test pattern is used to test the local DCB FT-DSU/CSU system integrity during local loopback testing. It can also be used to measure the T1 line quality. The diagnostics scenario is as follows:

1. First, send a remote loopback command to cause the remote facility to loopback DS0 channels.
2. Then, activate the local QRSS diagnostics operation, use the Test command to enable QRSS and choose tested DS0 channel in a bundle of DTE1, DTE2, DTE3, DTE4, D&I, or all 24 channels.
3. When the QRSS pattern sync is found, a bit error counter tracks total bit errors. It is advised to send QRSS for more than 15 minutes to evaluate the quality of loop condition and facility reliability.

In both front panel and terminal operation, the user may utilize the '>' key to inject a single error, the '<' key to reset the error counter, and the 'ESC' key to terminate the test. The user may also read a performance report to see what type of errors occurred.

7.3 Near End Loopbacks

The near end loopbacks are local loopback, line loopback, payload loopback, DTE port loopback, and D&I port loopback. They are activated from the local DCB FT and are at the near end facility. The following paragraphs describe each loopback in detail.

7.3.1 Local Loopback

Local loopback is illustrated in Figure 7.1. The outgoing signal is looped back through the T1 PCM transceiver. All 24 DS0 channels are looped back to the receiver path. This loopback test is activated by the Test command. This loopback test can be used with the QRSS diagnostic test pattern to validate the local DCB FT-DSU/CSU's integrity. An Alarm Indication Signal (AIS) is sent to the network during local loopback test. Local loopback test can be activated from the front panel or terminal as described in Section 4.7 and Section 5.12.

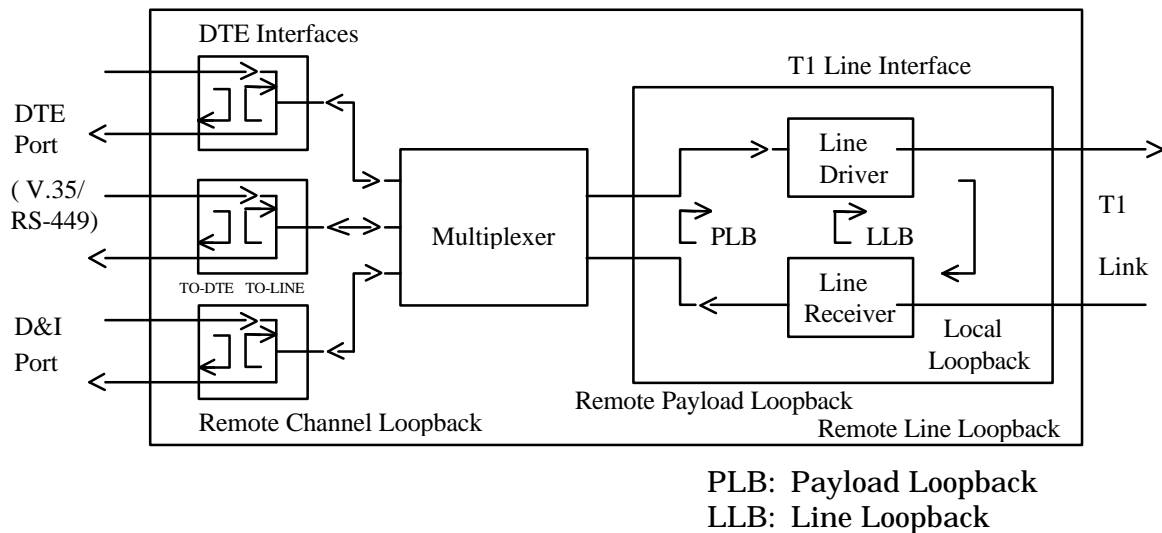


Figure 7.1 Loopback Block Diagram

7.3.2 Line Loopback

Line loopback is illustrated in Figure 7.1. The incoming T1 line signal is looped back to the outgoing T1 signal before the T1 transceiver framer. This loopback is used to isolate the local equipment from a troubled T1 transmission line. Line loopback test can be activated from the front panel or terminal as described in Section 4.7 and Section 5.12.

7.3.3 Payload Loopback

Payload loopback is illustrated in Figure 7.1. The incoming signal is looped back to the outgoing T1 signal after the T1 transceiver framer. This loopback is used to isolate the DTE ports and D&I port from the troubled T1 transmission line. Payload loopback test can be activated from the front panel or terminal as described in Section 4.7 and Section 5.12.

7.3.4 DTE Port Loopback

DTE port loopback is illustrated in Figure 7.1. There are two types of DTE loopback, TO-DTE and TO-LINE. The TO-DTE loopback loops toward the DTE port. The TO-LINE loopback loops toward the T1 network interface. This loopback is used to validate the system integrity of the DTE facility. DTE loopback tests can be activated from the front panel or terminal as described in Section 4.7 and Section 5.12. While in TO-DTE loopback, all ones are sent to the T1 network line on DTE associated DS0 channels.

7.3.5 D&I Port Loopback

D&I port loopback is illustrated in Figure 7.1. There are two types of D&I loopback, TO-DTE and TO-LINE. The TO-DTE loopback loops toward the D&I port. The TO-LINE loopback loops toward the T1 network interface. This loopback is used to validate the system integrity of the D&I facility. Drop and Insert loopback test can be activated from the front panel or terminal as described in Section 4.7 and Section 5.12.

7.4 Far End Loopback

The far end loopbacks are remote line loopback, remote payload loopback, and remote channel loopback. The remote facility utilizes inband coding and FDL Facility Data Link to initiate the loopback. It is advised that remote loopbacks be used in conjunction with QRSS diagnostics test to measure the T1 network line quality. The procedure is as follows:

1. First, send a remote loopback command to cause the remote facility to loop back some DS0 channels.
2. Then, activate the QRSS diagnostics operation by QRSS command as in Section 7.5.2.

The following paragraphs describe each type of remote loopback.

7.4.1 Remote Line Loopback

Remote line loopback is illustrated in Figure 7.1. The remote line loopback is initiated by the remote equipment through inband signaling or ESF data link message with AT&T or ANSI protocol. Table 7.1 shows the inband remote line loopback code. Table 7.3 shows the ANSI T1.403 ESF data link remote line loopback code. Remote line loopback test can be activated from the front panel and terminal as described in Section 4.7 and Section 5.12.

Table 7.1 In-band Control Codewords

Remote LLB	Codeword
Activate	10000, receive 5 \pm 0.5 second
Deactivate	100, receive 5 \pm 0.5 second

7.4.2 Remote Payload Loopback

Remote payload loopback is illustrated in Figure 7.1. The remote payload loopback is initiated by the remote equipment through ESF data link message with AT&T or ANSI protocol. Table 7.2 shows the AT&T ESF T1.403 ESF data link remote payload loopback code. Remote payload loopback test can be activated from the front panel and terminal as described in Section 4.7 and Section 5.12.

Table 7.2 AT&T ESF Data-Link Codewords

Remote PLB	Codeword
Activate	ESF-DL SX.25 Reuquest Message #1
Deactivate	ESF-DL SX.25 Request Message #2

Table 7.3 ANSI T1.403 Bit-Oriented ESF Data-Link Codewords

Remote LLB	Codeword
Activate	0 000111 011111111 repeat at least 10 times
Deactivate	0 011100 011111111 repeat at least 10 times
Remote PLB	Codeword
Activate	0 001010 011111111 repeat at least 10 times
Deactivate	0 011001 011111111 repeat at least 10 times

7.4.3 Remote Channel Loopback

Remote channel loopback is illustrated in Figure 7.1. The remote channel loopback is initiated by the local equipment through following methods:

1) In-band remote channel loopback code.

In-band activate and deactivate codes are used to enable and disable DTE to a TO-LINE loopback. This loopback provides an unique way to isolate problems of a specific data path from T1 network line toward remote DTE.

Activate code, 11110111 rotate left in 10 Hz for 5 ± 0.5 sec.

Deactivate code, 11011011 rotate left in 10 Hz for 5 ± 0.5 sec.

2) ESF and ESF&T1.403 facility data link remote channel loopback code.

A proprietary protocol in the ESF facility data link is used to enable and disable remote DTE port to perform TO-LINE loopback. This loopback provides an unique way to isolate problems of a specific data path from T1 network line toward remote DTE port.

The remote channel loopback command uses ESF data link message. The ESF data link message to activate request and response are in Table 7.4 and Table 7.5 and the data link message to deactivate request and response are listed in Table 7.6 and Table 7.7.

Table 7.4 Remote Channel Loopback Activate Request Messages

Octet No.	Label	Contents
1	Command #	0 to 255
2	Originate Unit Add	(A or Z) or (B or Y)
3	Target Unit Add	(A or Z) or (B or Y)
4	Request#	249
5~28	DS0~DS23	0: no action. 1: DTE1 activate loopback 2: DTE2 activate loopback 3: DTE3 activate loopback 4: DTE4 activate loopback 5: D&I activate loopback

Table 7.5 Remote Channel Loopback Activate Response Messages

Octet No.	Label	Contents
1	Command #	0 to 255
2	Status	0000U000
3	Originate Unit Add	(A or Z) or (B or Y)
4	Target Unit Add	(A or Z) or (B or Y)
5	Current Status	FU0000L0

NOTE

F=1, if U or L=1

U=1,if an unavailable signal state exists

L=1, if the PLB is activated

0(reserved)

Table 7.6 Remote Channel Loopback Deactivate Request Messages

Octet No.	Label	Contents
1	Command #	0 to 255
2	Originate Unit Add	(A or Z) or (B or Y)
3	Target Unit Add	(A or Z) or (B or Y)
4	Request#	249
5~28	DS0~DS23	0: no action. 1: DTE1 activate loopback 2: DTE2 activate loopback 3: DTE3 activate loopback 4: DTE4 activate loopback 5: D&I activate loopback

Table 7.7 Remote Channel Loopback Deactivate Response Messages

Octet No.	Label	Contents
1	Command #	0 to 255
2	Status	0000U000
3	Originate Unit Add	(A or Z) or (B or Y)
4	Target Unit Add	(A or Z) or (B or Y)
5	Current Status	FU0000L0

NOTE

F=1, if U or L=1.
U=1, if an unavailable signal state exists,
L=1, if the PLB is activated.
0(reserved)

7.5 Test Pattern

Four test patterns are available to determine faults such as deficient clock recovery, faulty ALBO level recovery, inadequate jitter margin, presence of bridge taps, and mis-optional network interface. These four patterns are framed patterns with proper D4 or ESF frame pattern as described in the following paragraphs.

7.5.1 3-in-24 Pattern

This framed 3-in-24 pattern is aligned with the frame bit so as not to transmit a false yellow alarm. It tests the consecutive zeros requirement and is useful to test AMI circuits.

Framed 3-in-24 pattern sequence is as follows,

F 01000100 00000000 00000100 01000 (Left to Right)

F indicates frame bit.

7.5.2 1-in-8 Pattern

This framed 1-in-8 pattern tests the ability of a circuit to support a pattern having the minimum ones density. It is useful to reveal a timing recovery problem. The bit set to one must be set to bit 2 to avoid a false yellow alarm.

Framed 1-in-8 pattern sequence is as follows,

F 01000000 01000000 0100 (Left to Right)

F indicates frame bit.

7.5.3 2-in-8 Pattern

This framed 2-in-8 pattern, in conjunction with the 1-in-8 Pattern, is useful when performing tests to reveal the presence of equipment mis-optioned for B8ZS. Use of 2-in-8 pattern will confirm the circuit's ability to support error free transmission when B8ZS substitutions do not occur. A framed 1-in-8 will contain 8 consecutive zeros around a zero frame bit causing a B8ZS substitution.

Framed 2-in-8 pattern sequence is as follows,

F 01000010 01000010 01 (Left to Right)

F indicates frame bit.

7.5.4 1:1 Pattern

This framed 1:1 pattern tests AMI circuits. It will cause false yellow alarms in D4 frame format mode.

Framed 1:1 pattern sequence is as follows,

F 10101010 10101010 10 (Left to Right)

F indicates frame bit.

8. WARRANTY

All DCB products are warranted to be free of defects in materials and workmanship for one year. Data Comm for Business, Inc. will repair or replace any equipment proven to be defective within the warranty period. All warranty work is F.O.B. Champaign, IL. This warranty is exclusive of abuse, misuse, accidental damage, acts of God or consequential damages, etc. DCB liability shall not exceed the original purchase price.

All equipment returned for warranty repair must be accompanied by a Returned Material Authorization (RMA) number. To receive an RMA number, call (217) 352-3207 between the hours of 8 AM and 5 PM central time. Equipment must be shipped prepaid to DCB and will be returned at DCB's expense.

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9. GLOSSARY of TERMS

A

AIS Alarm Indication Signal
AMI Alternate Mark Inverting
ANSI American National Standards Institute

B

B8ZS Bipolar 8 Zero Substitution

C

CSU Channel Service Unit
CTS Clear to Send

D

D&I Drop and Insert
DACS Digital Access Cross-Connect System
DSR Data Set Ready
DSU Data Service Unit
DTE Data Terminal Equipment
DTR Data Terminal Ready

E

ES Errored Seconds
ESF Extended Super Frame

L

LAN Local Area Network
LBO Line Build Out
LLB Line Loopback
LOFS Loss of Frame Sync
LOS Loss of Signal

N

NI Network Interface

O

OOF Out of Frame

P

PBX Private Branch Exchanges
PLB Payload Loopback
PLL Phase Lock Loop

Q

QRSS Quasi-Random Signal Sequence

R

RTC Real Time Clock
RTS Request to Send

S

SNMP Simplified Network Management Protocol

T

TE Terminal Equipment
TTM Terminal Timing Mode

W

WAN Wide Area Network